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No. 8

SAULT POWER CANAL.

IMPORTANT HEARING BEFORE RIVERS AND HARBORS COMMITTEE IN WASHINGTON—OLD CHANNEL IN ST. MARY'S RIVER TO BE MADE READY FOR LIGHT DRAUGHT VESSELS.

It is more than probable that two important results will follow the visit to Washington a few days ago, of a very strong committee from the Lake Carriers' Association. First it is expected that the Consolidated Lake Superior Co., which has undertaken, in the construction of a power canal at Sault Ste. Marie, Mich., the greatest hydraulic development ever attempted in this country, will be compelled in its own interests and on account of the outcome of a hearing before the rivers and harbors committee, to go before congress for legislation defining the position of the project in relation to the authority of the general government, thus safeguarding the interests of navigation in the St. Mary's river. It may be safely said also that as a result of the efforts of this delegation in Washington the rivers and harbors committee will make such arrangements regarding funds now available for St. Mary's river improvements as will permit of an expenditure, within the earliest possible time, of about \$100,000 in cleaning up to 15 or 15½ feet navigation the old channel in the St. Mary's river, which was used before the Hay lake channel was completed. When this is done the Lake Carriers' Association will try to induce all upbound light vessels as well as vessels of light draught bound down to take the old channel. The delegation also secured from nearly all the representatives of lake districts in Washington assurance of their support for the bill appropriating \$20,000 to reimburse the Lake Carriers' Association for expenditures on account of private lights, and if this money is refunded it will undoubtedly be used for the erection of a memorial of some kind at the Sault in honor of the late Gen. O. M. Poe.

The first matter taken up before the rivers and harbors committee was the Sault power canal project. The vessel interests were represented by a very strong committee, as will be seen by the list of names: W. C. Farrington, president of the Lake Carriers' Association, Buffalo; C. H. Keep, secretary, Buffalo; Harvey D. Goulder, counsel, Cleveland; James Corrigan, H. Coulby, Cleveland; Edward Smith, Buffalo; L. C. Waldo, Detroit; David Vance and W. E. Fitzgerald, Milwaukee; D. Sullivan, Chicago; A. B. Wolvin, Duluth. Mr. James H. Hoyt of Cleveland was also with the delegation, but as a representative of the Cleveland Chamber of Commerce. The power canal company was represented by Mr. E. B. Douglas of Philadelphia, president; Francis H. Clergue of Sault Ste. Marie, Ont., vice president and general manager; W. P. Douglas of Philadelphia, secretary; H. Von Schon, of Sault Ste. Marie, Mich., engineer; Geo. Y. Wisner of Detroit acting in an advisory engineering capacity; John C. Shaw of Detroit, counsel; Mr. Theodore C. Search of Philadelphia, president of the American Association of Manufacturers, who is one of the directors of the company, and Mr. Osborne of Sault Ste. Marie, Mich. As it is the intention of the Review to present in an early issue a very full description, with illustrations of the Sault project, it will not be necessary to go into detail in that regard for an understanding of what was done at Washington. The power canal representatives certainly took great pains to present in a most graphic manner to the rivers and harbors committee their project for controlling the outflow of the St. Mary's river. This was first done with charts, photographs, etc., by engineer Von Schon, who is of high standing in work of this kind. The officers of the power company were all able in argument and were continually at work with the members of the congressional committee, who showed unusual interest in the project. The hearing introduced Mr. Clergue, the promoter of the enterprise, to the vessel men in such a way that he will not soon be forgotten by them. He talked of this undertaking of millions with more ease and mastery of detail than might be expected in an affair of a few thousands. "The controlling works to be put into the rapids of the St. Mary's river," he said, "while conserving the interests of the water power development, would at the same time improve the existing conditions of the navigable channel. The power company was as much interested as the vessel owners in maintaining a high stage of water. The problem of controlling works was not new and there were no uncertain engineering questions involved. His company was willing that the government engineers should be given the right to close the canal gates at any time if navigation was interfered with." In answer to a question as to what this water power was to cost, Mr. Clergue said the company had \$6,000,000 available, of which \$3,500,000 had been spent.

Mr. Harvey D. Goulder, counsel for the Lake Carriers' Association, took the position that the attitude of the vessel owners before the committee was simply of an advisory nature. The extreme importance of a loss of even a couple of inches of draught to lake vessels may be understood when it is known, as he stated, that the ships, mines, ore and coal railways, docks and cognate interests represent a combined capital of not less than five hundred millions. Mr. Goulder referred to the complaint made by the local engineers at the Sault shortly after the canal work was started and which it was expected would result in proceedings on the part of the legal department of the government but which was not heard of afterward; also to the letter of Gen. Alger while he was secretary of war, which it was said carried certain rights, and to the report of the board of army engineers against the project. He referred to these matters because it seemed strange that the project should go along in such an indefinite position. He said several times that he thought it would be better for the company themselves that their position in relation to the government should be clearly defined and not have their work go along in uncertainty. Mr. Goulder suggested that, inasmuch as the plans of the company had been modified, another board of engineers to look into the project might possibly be appointed to advantage.

Mr. Goulder's argument was listened to with great interest, as was also that of Mr. James H. Hoyt, who dealt mainly with the legal side of the position occupied by the canal company. Mr. Hoyt undoubtedly left a very strong impression with the lawyers on the committee as to the indefiniteness of the canal company's position.

Mr. Clergue said his company had no objection to the appointment of another board of engineers, but he thought such a board should be divided as to army and civil engineers. The letter of Gen. Alger, he said, neither increased nor diminished the rights of his company.

Col. G. J. Lydecker, U. S. engineer in charge of St. Mary's river improvements, was in attendance at the hearing and was called upon by the committee. He was a member of the board of engineers that reported against the project some time ago. He said he had not since changed his opinion in any way. The uncertainty regarding the effect of the canal on the navigable channel is due to insufficiency of hydraulic data upon which to make determinations. He said that two of his assistants had computed the volume of discharge of the St. Mary's river for high and low stages of Lake Superior and arrived at results differing largely from results used by Mr. Noble, the power canal engineer, in his report to the power canal company.

Just following the hearing, Mr. Geo. Y. Wisner, who was called in by the power company on account of Mr. Noble's absence on the Nicaragua canal commission, said that the statement of Col. Lydecker about difference of results between his assistants and Mr. Noble had the appearance of being very misleading. "The fact so far as known outside of Col. Lydecker's office," said Mr. Wisner, "seem to be that one of Col. Lydecker's assistants made observations in 1895 and 1896 to determine the outflow of Lake Superior, from which he computed an equation which is stated in reports to give the volume of discharge within less than 5 per cent. This equation was furnished to Mr. Noble from Col. Lydecker's office, and therefore the inference that the two engineers, using the same data, had arrived at widely different results was apparently uncalled for. The data used by Mr. Noble was obtained from the man who made the observations and computed the equation used, and until the statement was made today was supposed to be correct."

MARYLAND COMPANY ASKS FOR NO SPECIAL FAVOR.

A report from Washington of the "special dispatch" kind, printed in the Sun of this city a few days ago, is to the effect that the Maryland Steel Co. will fail to complete its contract for building three torpedo boat destroyers on time; that unless Secretary Long extends the limit the company will lose heavily on the work and that reports show that but 8 per cent. of the work has been performed. The dispatch concludes with the statement: "But it is also said the naval officials attribute much of the delay to lack of proper interest."

Mr. A. G. Wilson, manager of the Maryland company's marine department thus answers the dispatch: "It is true that neither of these vessels, nor any of those for which contracts were awarded to other builders in the fall of 1898, will be completed on time, but it is not true that only 8 per cent. of the work has been performed and there has been no suggestion made to this company by any official of the navy department that we have shown 'lack of proper interest.' The unprecedented demand on the mills for steel plates and shapes has made it impossible to get the materials as required—some orders thirteen months old remaining unfilled—and notwithstanding the report of one of the bureaus that but 8 per cent. of its particular part of the construction had been performed, it is a fact that the work has progressed to the extent of from 30 per cent. on two of the boats to 35 per cent. on the other. The proper officials have approved claims amounting to 20 per cent. on each of the boats, and the company has received its money. The following extract from a supplementary report made by one of the bureau chiefs, a member of the board of construction, to which was referred a petition from nearly all of the contractors for torpedo boats and destroyers, praying for an extension of time, states the situation very fairly:

"The figures given in paragraph 3 (7 per cent. of completion in the case of the Maryland Steel Co. to 77 per cent. of completion in the case of the Fore River Engine Co.) do not in my opinion represent the real position of the builders as regards their contract, nor do they give any proper indication of the probable order of completion. It is a question of judgment on the part of the contractors whether or not to push the work in the early stages when the material necessary is not in sight."

"This company will ask for no more time than any of the other builders, and will probably not require as much as some of them."

NAVAL NOTES.

Washington, D. C., Feb. 21.—Vessels of the United States navy are still officially classed under a law passed in 1858 before the advent of armor clads. The act placed in the first class steamships which carried forty guns or more; in the second class those carrying less than forty guns or more than twenty guns; and in the third class those carrying less than twenty guns. A bill reported favorably by the senate naval affairs committee has for its object a classification of the vessels on an up-to-date basis. It provides that "vessels of 5,000 tons displacement or more shall be classed as first rates; those of 3,000 tons or more or below 5,000 tons as second rates; those of 1,000 tons or more and below 3,000 tons as third rates; those of less than 1,000 tons as fourth rates."

The bill also prescribes the grade of officers who shall command each class thus: "First and second rates by captains; second and third rates by commanders; fourth rates by lieutenant commanders and lieutenants; torpedo boats and other unclassified vessels by officers below the grade of lieutenant commander."

AMERICAN BUILDERS OF STEAM YACHTS. 0-283

RAPID DEVELOPMENT OF A BRANCH OF SHIP BUILDING THAT HAS EXTENDED TO NEARLY ALL THE PRINCIPAL YARDS.

The American ship builder in his efforts to develop an approved and distinctive practice in steam yacht construction is confronted by two very serious obstacles—the proneness of our wealthiest yachtsmen to place their contracts abroad and a spirit of disinclination to pay the prices which must be asked if the vessels are to be in all respects of a first-class kind. Still steam yacht construction may be said to have made greater progress during the past two years than in any previous decade. The Spanish war afforded, perhaps, the greatest boon that has yet come to the steam yacht constructor. It removed from the pleasure fleet a large number of vessels of this kind, and the uncertainty as to how long the government would require them, combined in many cases with a natural desire for better craft, brought on new orders. If we exclude the yachts of European rulers it is found that the largest pleasure craft on the other side of the Atlantic—that of Baron Rothschild—is now exceeded in tonnage by eight or ten similar vessels of American ownership, and yet it is little more than a year since one of our ship yards turned out the first yacht that exceeded 300 feet in length.

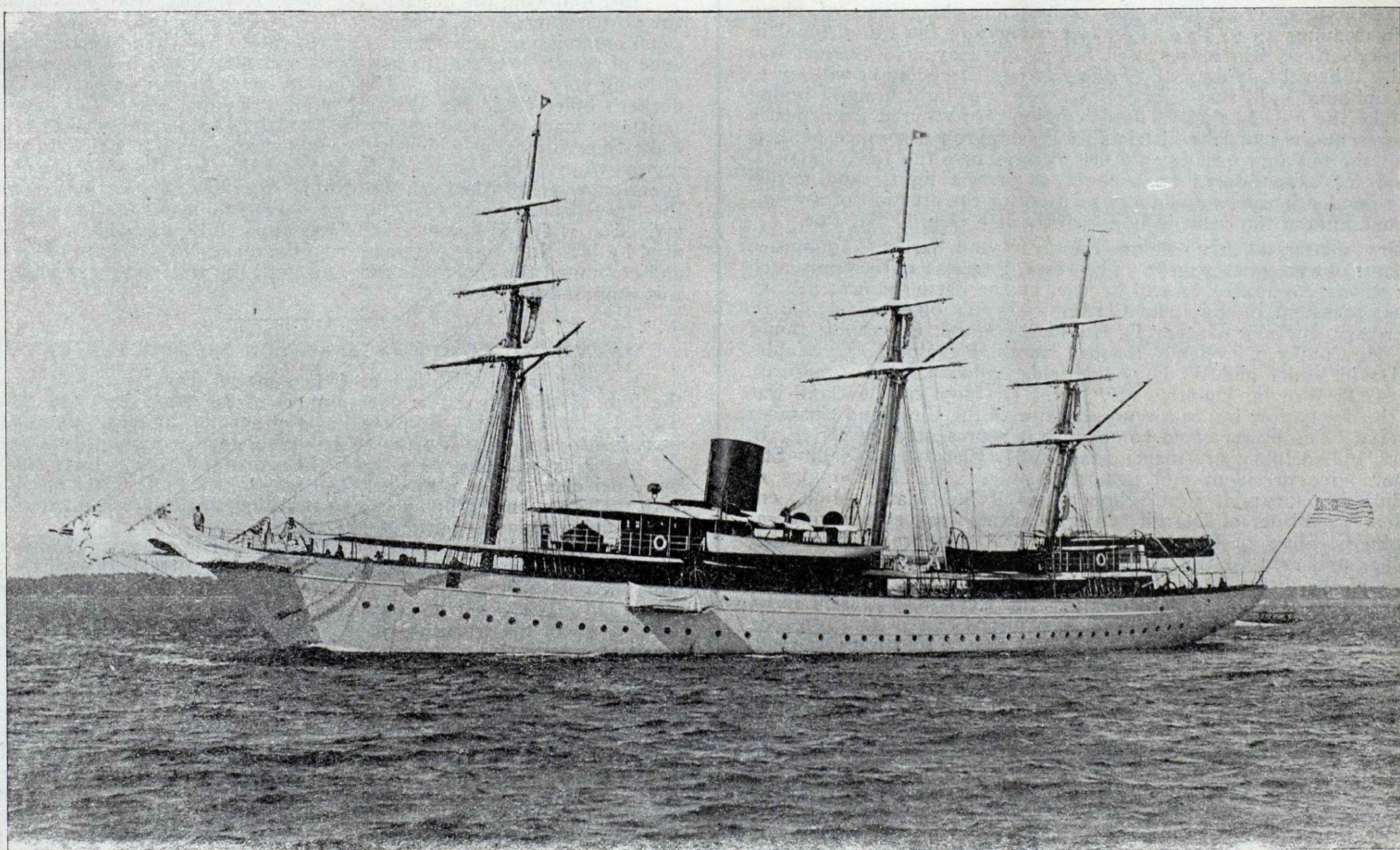
Of the yachts costing at a minimum \$50,000 and ranging from that figure up to \$400,000, more than twenty-five have been built within the past two years, and in a number of them have been embodied features

252 feet water line, 30 feet beam and 20½ feet depth, and draws 14½ feet of water. She is fitted with two triple expansion engines of large horse power driving twin screws, and steam is supplied from two double-ended Scotch boilers.

HOWARD GOULD'S NIAGARA—YACHTS OF ROACH CONSTRUCTION.

Howard Gould's yacht the Niagara, which has proven such a credit to her builders, the Harlan & Hollingsworth Co. of Wilmington, Del., should hardly be included perhaps in the yachts of latest construction. The Roach yard at Chester, Pa., has turned out during the past twenty months a very creditable fleet of this kind, most of which were designed by Gardner & Cox, naval architects of 1 Broadway, New York city. This fleet included the Malay, built for Dr. Weld of Boston; the Aileen for Richard Stevens of Hoboken, N. J.; and vessels equally handsome for Eugene Tompkins of Boston; J. Gardner Cassatt of Philadelphia and A. E. Tower of Poughkeepsie, N. Y.

The Neafie & Levy Ship & Engine Building Co. of Philadelphia, built but one steam yacht during the year, the Josephine, for Mr. P. A. B. Widener, but she is such a magnificent specimen of the ship builder's art as to prove quite as effective a testimonial as an entire fleet. The Josephine is 258 feet in length over all, 216 feet on the water line, 30 feet beam



STEAM YACHT AMERICAN, BUILT FOR COMMODORE WATT BY THE JOHNSON FOUNDRY AND ENGINEERING CO. OF NEW YORK.

that are both original and distinctive. It is significant also that this work has not been restricted to a few firms. Fully half a dozen of the larger yards on the Atlantic coast, and several of the smaller ones as well, are represented in this fleet. Finally there has appeared that most hopeful sign of all—the disposition in several establishments to give special attention to this branch of the ship building industry and to educate naval architects and craftsmen in the various branches of the work to the extent of making it a specialty.

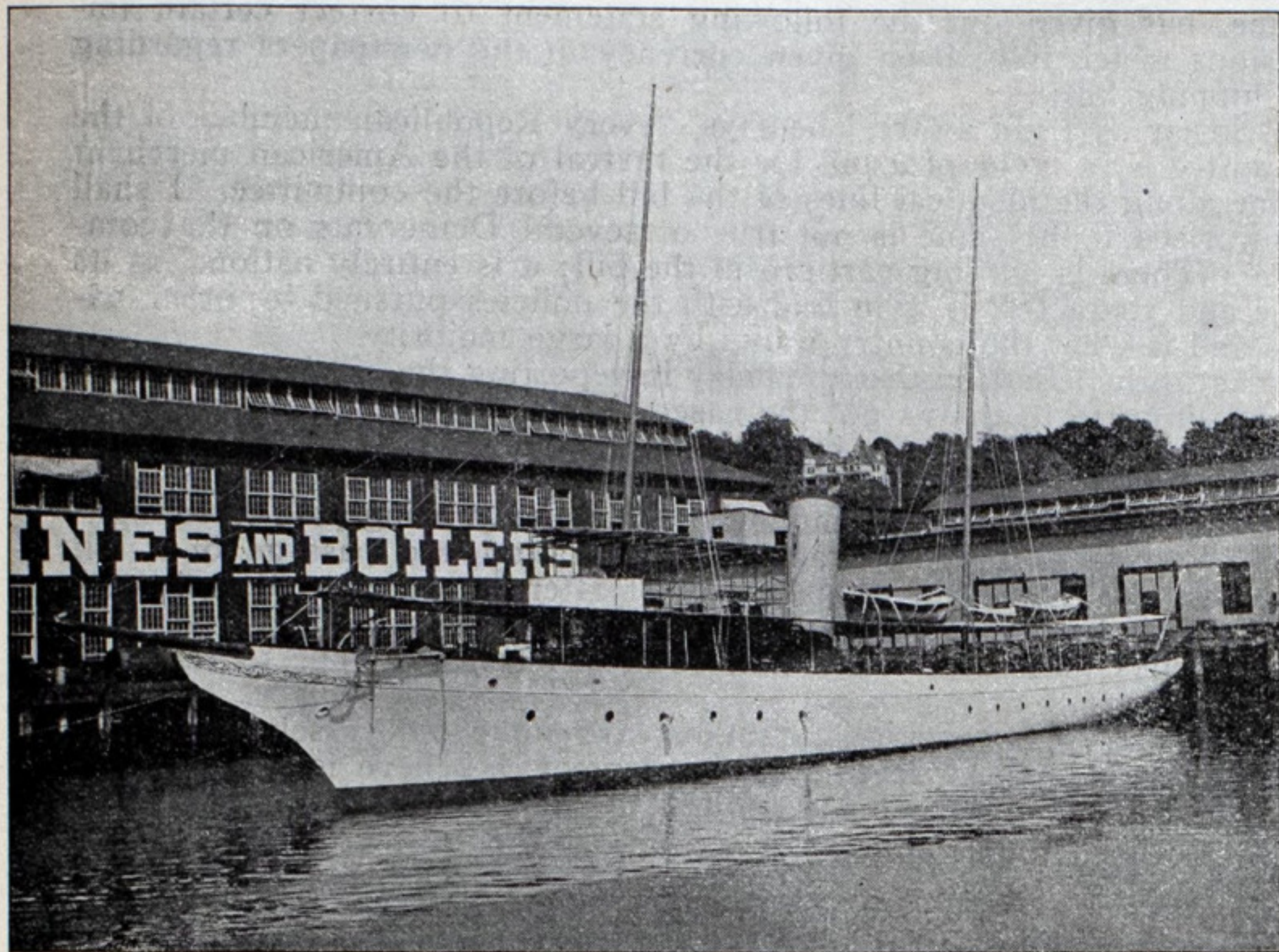
Probably the most interesting steam yachts constructed in America within the period mentioned were the Corsair and Aphrodite, two vessels of about the same length, but differing, of course, very radically in other respects. The Aphrodite, which was built by the Bath Iron Works, Bath, Me., for Col. O. H. Payne of New York city, is more or less familiar to most of our readers through repeated descriptions in these columns. She is not only the largest steam yacht ever constructed in the United States and the most powerfully-engined pleasure craft in the world (private ownership), but her builders claim that she has no superior anywhere in the matter of cruising qualities. The Aphrodite is 303 feet over all, 260 feet between perpendiculars, 35 feet beam and 16 feet draught. The hull is divided into fifteen watertight compartments and there are no less than nine athwartship steel bulkheads. She is fitted with triple expansion engines that have cylinders of 28, 43 and 70 inches diameter and 36 inches stroke, to which steam is supplied from four single-ended boilers, which under natural draft will provide steam for the development of 3,200 indicated horse power. Under forced draft the Aphrodite can make considerably better than 17 knots.

The Corsair was constructed for J. Pierpont Morgan by the W. & A. Fletcher Co. of Hoboken, N. J., who awarded the contract for the hull to T. S. Marvel & Co. of Newburgh, N. Y. The vessel is 303 feet over all,

molded, 18½ feet in depth to the main deck and 26½ feet in depth to the awning deck. With the idea of securing unusual strength, several unique features have been introduced. A cast steel stem and stern frame are thoroughly secured to the hull. The plating, flush and very neat above the water line, is carried to the awning deck, which permits of a high free board. The awning deck extends from the stem aft about three-fourths of the length of the vessel, with main deck the balance of the distance enclosed by a high steel waist. The machinery of this vessel consists of one inverted, direct acting, quadruple expansion engine, having cylinders of 19½, 28, 39 and 57 inches diameter and a common stroke of 36 inches. Steam at 200 pounds is supplied from two cylindrical return-tubular boilers, 14 feet 9 inches in diameter and 11 feet long, with four corrugated furnaces each.

Another vessel that will serve to attract attention to steam yachts of American construction is the American, which was designed by Commodore Archibald Watt to gratify the ambition of his wife for a cruising yacht that could not be burned, sunk or destroyed by stranding, except under conditions of a most extreme kind. Many officers of the United States navy have examined this novel craft, which was built by the Johnson Engineering & Foundry Co. of New York city, and are unanimous in praise of some of the features involved in her construction. Indeed, Chief Engineer George W. McGee, a naval officer, is reported to have declared that the hull affords greater precautions against sinking than any battleship afloat. The American is 254 feet over all, 38 feet beam and 21 feet depth of hold and draws 12½ feet of water. She is fitted with two quadruple expansion engines of 3,200 horse power and is capable of maintaining a speed of 17 knots. The coal bunker capacity is 650 tons, which would suffice for a 65-day cruise. The yacht has sixteen watertight compartments on either side of the keel. Above these lower compartments

are nine steel bulkheads, which reach to the upper deck, two of them separating the deck house. The steel keelson is only 4 inches narrower than those used in the steamers St. Louis and St. Paul of the American line. Frames of the steel ribs are Z-shaped, while those in the old battleship Maine, reported to have been the strongest vessel of her size in the navy, were L-shaped, although of the same thickness. All the decks are of steel, together with the two deckhouses, which are 70 and 40 feet in



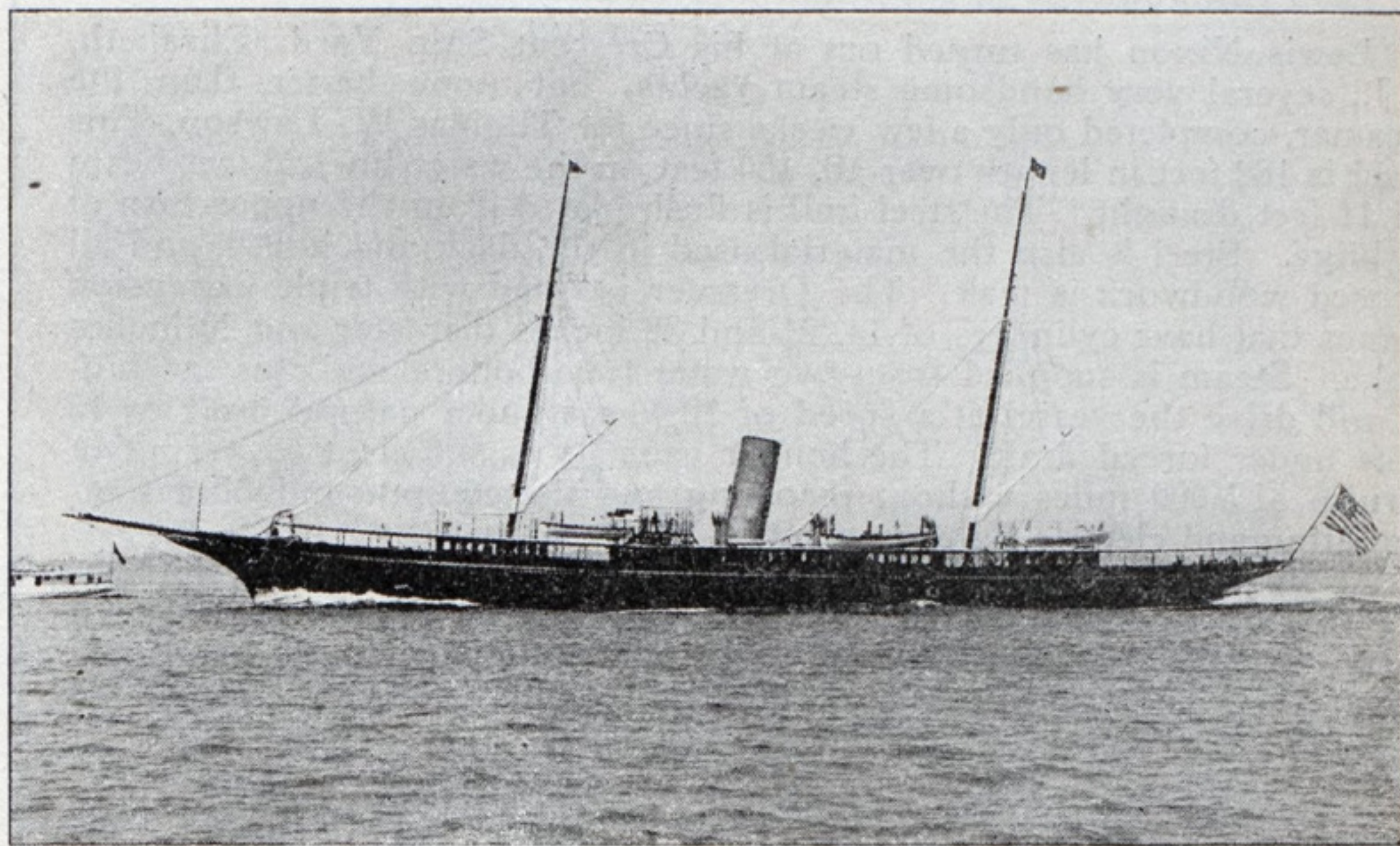
STEAM YACHT MAYITA RECENTLY COMPLETED FOR LOUIS BOSSERT, BROOKLYN, NEW YORK.

length respectively. The yacht carries two 25-foot naphtha launches with alco-vapor motors, one large steam launch, a 31-foot gig, life boat and dingy. She is also fitted with a complete equipment of Blake pumps.

BATH-BUILT YACHT VIRGINIA.

A Bath-built steam yacht which has attracted no small degree of attention since she came out several months ago is the Virginia, which bears the name of the wife of her owner, Isaac Stern of New York city. This vessel was constructed in the remarkably brief space of eight months, and her builders, the Bath Iron Works denominate her the handsomest steam yacht yet turned out in America, with the exception of the Aphrodite and

forward of this point. Sixteen men are carried on the main deck forward and eight petty officers are carried on the lower deck forward. These rooms are well lighted and ventilated and are complete in all their appointments. On the forecastle deck a Hyde break windlass, with vertical engine, and a small steam pump for mast, chain and deck purposes is carried. The owner's quarters are on the lower deck forward. Here are private, roomy staterooms for the owner, his wife, son and daughter; also a maid's room and two guests' rooms. Three bath and toilet rooms are also located on the forward lower deck. On the lower deck aft are three guest staterooms and a bathroom designated as bachelor's quarters. At the extreme aft end of the lower deck are the officers' quarters, which consist of five staterooms, wardroom, messroom, pantry, etc. On the



COMMODORE MORGAN'S STEAM YACHT CORSAIR.

main deck, in the forward end of the deck house, is the dining saloon, finished in rich mahogany. Aft it, and in direct communication, is a roomy pantry, which in turn adjoins a spacious galley. A vestibule just abaft of the dining saloon on the starboard side has stairs leading to the deck below.

Aft of the machinery space is the deck saloon, finished in white with dark mahogany furniture. Then comes the smoking room, finished in natural oak, deck watercloset and stairs leading to the officers' quarters below. A passageway in the deck house connects the dining room and vestibule forward with the deck saloon and smoking room aft. From this passageway stairs lead to the shade deck, the companionway being the forward part of a massive engine room skylight. Between the fore



STEAM YACHT APHRODITE, BUILT BY THE BATH IRON WORKS, BATH, MAINE, FOR COL. O. H. PAYNE.

Corsair. Accommodations on the Virginia are remarkable, and it is wonderful to see what a large number of well-arranged, spacious compartments have been crowded into a steam yacht of only 212 tons net registered tonnage. This vessel is 200 feet long over all, 165 feet long on the water, 26 feet beam, 16 feet deep and 12 feet draught. The main and lower decks break at the collision bulkhead, which is placed well aft from the stem, and a forecastle deck is worked at the height of the main rail

and main rigging the shade deck runs out to the side of the vessel. On the shade deck just forward of the stack is a mahogany pilot house or chart room, the top of which forms the navigating bridge. The Virginia has paneled teak bulwarks, teak waterway gratings and rail, mahogany paneled deck houses, skylight companionways, etc. Almost all the deck fittings are of brass, and every part of the vessel down to the minutest detail is made of the best material in the best possible manner. The ves-

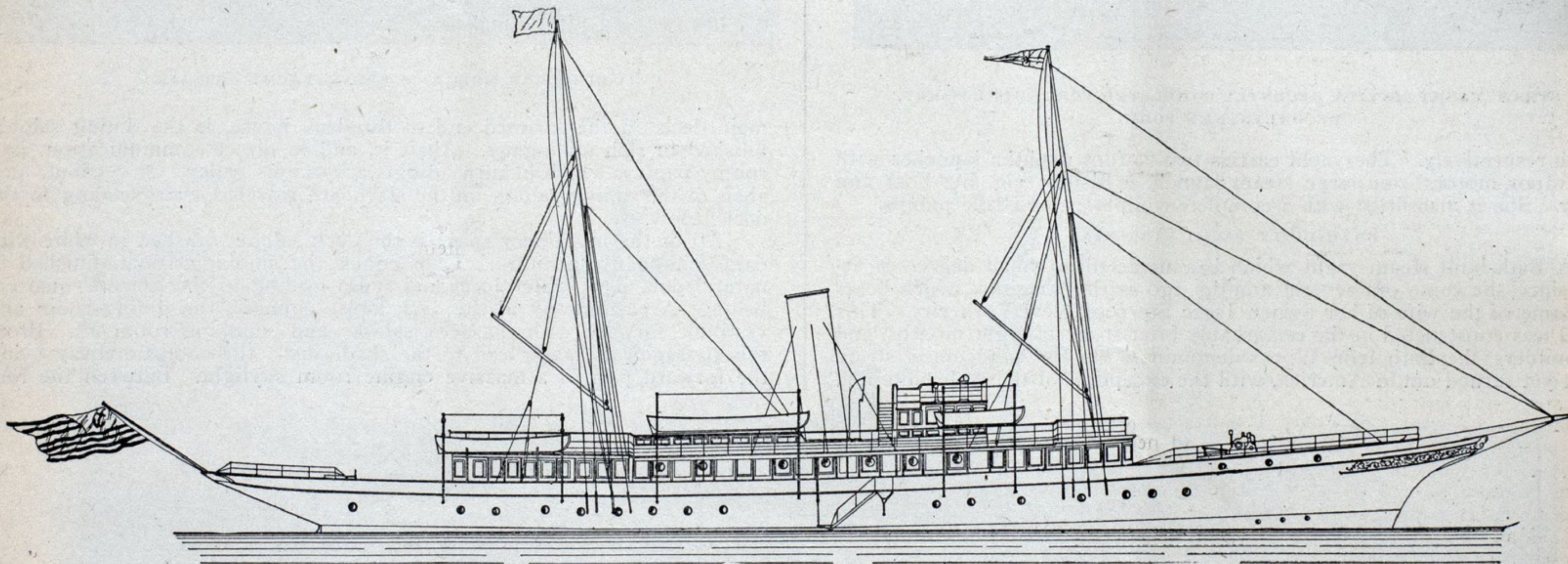
sel is a compromise between the British Watson yacht and the American high-class yacht of the type lately constructed by the Bath Iron Works and she is without doubt a credit to her builders.

The engine is of the vertical, inverted, direct-acting triple-expansion type with cylinders of 16, 26 and 41 inches diameter respectively and 27 inches stroke. With 170 revolutions the power developed is 1200. A steel Scotch boiler, working at 180 pounds of steam, 14 feet diameter and 12 feet long, with 64 square feet of grate surface, furnish the steam under forced draft. A vertical donkey boiler is fitted. The auxiliaries are very complete and include an Allen dense air ice machine, General Electric dynamo, Williamson steam steerer and an evaporator. The Virginia left New York for a Mediterranean cruise last month.

FROM THE WORKS OF LEWIS NIXON AND THE GAS ENGINE & POWER CO.

Lewis Nixon has turned out at his Crescent Ship Yard, Elizabeth, N. J., several very handsome steam yachts, but none better than the Dreamer, completed only a few weeks since for Thomas W. Lawson. This vessel is 182 feet in length over all, 150 feet on the water line, 23 feet beam and 11 feet draught. The steel hull is flush plated from the upper turn of the bilge. Steel is also the material used in the deck and house, and all exposed woodwork is teak. The Dreamer is fitted with triple expansion engines that have cylinders of 14, 21 and 32 inches diameter and 20 inches stroke. Steam is supplied from two water tube boilers, and this machinery will drive the vessel at a speed of 12 knots under natural draft or 15 knots under forced draft. The bunker capacity is sufficient to permit of a cruise of 5,000 miles without recoaling and the equipment includes refrigerating and electric lighting plants.

As in past years the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, of Morris Heights, New York city, has, of course, turned out during the year just closed some particularly handsome pleasure vessels. One of these is the steam yacht Kanawha, constructed



THE STEAM YACHT VIRGINIA—THE LATEST PRODUCT OF THE BATH IRON WORKS, BATH, MAINE.

for John P. Duncan of New York city, and which in a race with the steamer Monmouth from Atlantic Highlands to the Battery attained a speed of 23 miles an hour. The Monmouth, it may be explained, was considered until the advent of the Kanawha, the fastest craft in the vicinity of New York, barring racing machines constructed for short spurts. The Kanawha is 227 feet over all, 192 feet water line, 24 feet beam and 10 feet draught. Twin screws are driven by Seabury triple expansion engines with cylinders of 14½, 24 and 42 inches and 24 inches stroke. The steel steam yacht Aria, built by the same company for E. H. Blake of Bangor, Me., is a trim little craft. She is 145 feet in length and can easily be speeded at 18 miles. Seabury water tube boilers furnish steam to an engine that has cylinders of 11, 16½ and 26 inches diameter and 12 inches stroke. Still another product of the Morris Heights plant, the composite yacht Mayita, is 135 feet over all. Her machinery is very similar to that of the Aria, but her speed under ordinary conditions is slightly less. She is owned by Louis Bossert of Brooklyn, N. Y.

A HAPPY THOUGHT.

The Lake Carriers' Association asks in a bill now before congress to be reimbursed to the extent of \$20,000 for expenditures made during the past few years in the maintenance of private lights at several points in the connecting channels of the lakes where lights should have been provided by the government. The bill is being looked after by Senator McMillan of Michigan who will have the assistance of other members of congress from the lake districts in trying to bring about its passage, as the committee of vessel men who visited Washington a few days ago managed to direct the attention of nearly all the lake members to the justice of the measure.

Now it is proposed to apply this \$20,000, if it is paid back to the vessel men by the government, to the erection of a Poe memorial at Sault Ste. Marie. This suggestion will undoubtedly meet with the approval of all vessel owners, as no engineer ever connected with government works in America was held in higher esteem than the late Gen. Orland M. Poe.

Some idea of what the size of the new navy will be when all the vessels of all descriptions now building are completed, can be gained from the statement that to man these vessels 3,084 officers will be required, and 32,933 men will have to be enlisted. At present there are 1,062 officers and 14,996 men in the navy.

SAME AS WITH THE TARIFF.

SITUATION CONFRONTED BY ADVOCATES OF THE SHIPPING BILL—ALL MANNER OF FALSE STORIES—A STATEMENT FROM GENERAL GROSVENOR.

WASHINGTON OFFICE OF THE MARINE REVIEW, 1345 PENNSYLVANIA AVE. }
WASHINGTON, D. C., February 21, 1900. }

Gen. Charles H. Grosvenor, chairman of the committee on merchant marine, has given out the following statement to correct certain impressions which have been given currency in the newspapers regarding the shipping bill:

"So far as I am aware," he says, "every Republican member of the committee is in favor of a bill for the revival of the American merchant marine along the identical lines of the bill before the committee. I shall be surprised if the same is not true of several Democrats on the committee. There is nothing partisan in the bill; it is entirely national in its scope and character; it is in line with the policies pursued by other nations and is what the country wants by a large majority.

"As to the assertion that the delay in reporting the bill is an evidence of opposition to it, this is not the case. The bill is one of the most important before congress. It proposes to do for American shipping what congress has neglected to do for over a generation. Naturally with \$200,000,000 a year in freight moneys now annually being paid to foreigners by Americans the preparation, consideration and passage of a bill to correct this condition needs the most attentive care to the minutest details. It is precisely this that the bill is receiving and will receive until it is a perfect measure. When that point is reached I hope to report it and to see it promptly passed.

"I notice the suggestion that there are some old vessels under the American flag in the foreign trade—seventeen I believe is the number; but, whatever the number, it is enough to say that with American ship-

ping in the foreign trade in competition with cheaper-built foreign ships, the latter being run cheaper than the American vessels, and enjoying subsidies and other government aid to the extent of over \$25,000,000 each year, it is not so surprising that there are old American vessels in existence as it is surprising that there are any at all.

"This bill proposes to correct all of this. It proposes to put American vessels in the foreign trade on an equality with the foreign vessels now doing our carrying. When that is done we expect to see American ship yards turning out the shipping that is needed to do our foreign carrying. There are some people who are so afraid that this bill will give a chance to American ships to secure a share of our foreign carrying that they can't sleep nights and these are the ones who are hatching up the rumors, false and partially false, with which the people are being regaled in the opposition and free trade press of the country.

"I don't find any of the American free trade papers denouncing the subsidies and bounties the foreign ships in competition with our own receive. They reserve their denunciation for the suggestion that American ships be put upon an equality of conditions. It's the same kind of situation we confronted several times on the tariff bill and the country hasn't been ruined by that. I believe there is no bill before congress today that means so much of material benefit to the nation and to the people in every part as this shipping bill.

"Of course I expect to see this bill presented for passage at the present session. Of course we expect to see it passed at this session. The evils of paying out \$200,000,000 a year to foreign ship owners cannot, in my judgment, be corrected too soon, nor can the provision be made too liberal or too permanent in its nature to accomplish this. I believe this is what the country wants by a large majority regardless of section and regardless of politics. This is a non-partisan, national measure, designed to accomplish as much good in the south and in the north, in the west and in the east as the ship building facilities of the country, present and prospective, are capable of accomplishing. Twenty years of operation of this bill, in my judgment, will place the United States in the front rank as a maritime nation. And when we are in that position there will be no conceivable end to the expansion of our commerce in all parts of the world. When the record of hearings is printed the public will be greatly surprised to see with what wonderful unanimity the organizations of merchants and manufacturers, farmers and business men, of all kinds, including labor in all forms, support this bill."

SUMMARY OF NAVAL CONSTRUCTION.

Washington, D. C., Feb. 21.—The monthly naval summary of construction shows that the battleships have progressed in construction thus far: Kearsarge, at Newport News works, 99 per cent; Kentucky, Newport News works, 97 per cent; Illinois, Newport News works, 74 per cent; Alabama, Cramp & Sons, 92 per cent; Wisconsin, Union Iron Works, 87 per cent; Maine, Cramp & Sons, 21 per cent; Missouri, Newport News, 1 per cent; Ohio, Union Iron Works, 13 per cent.

Sheathed protected cruisers—Albany, Armstrong's, England, 98 per cent. The other cruisers, the Denver, Des Moines, Chattanooga, Galveston, Tacoma and Cleveland have not yet been laid down.

Monitors—Arkansas, Newport News, 16 per cent; Connecticut, Bath Iron Works, 38 per cent; Florida, Lewis Nixon's yard, 23 per cent; Wyoming, Union Iron Works, 39 per cent.

The torpedo boat destroyers are precisely as they were in the last report, the builders being unable to get the materials for their construction: Bainbridge and Chauncy, Neafie & Levy, 42 per cent each; Barry, Neafie & Levy, 41 per cent; Dale, William R. Trigg Co., 59 per cent; Decatur, William R. Trigg Co., 58 per cent; Hopkins & Hull, Harlan & Hollingsworth, 35 per cent each; Lawrence, Fore River Engine Works, 82 per cent; Macdonough, Fore River Engine Works, 80 per cent; Paul Jones, Perry and Preble, Union Iron Works, each 68 per cent; Stewart, Gas Engine & Power company, 13 per cent; Truxton, Whipple and Worden, Maryland Steel Co., 8 per cent each; Stringham, Harlan & Hollingsworth, 93 per cent; Goldsborough, Wolff & Zwicker, 98 per cent; Bailey, Gas Engine & Power Co., 75 per cent; Bagley and Barney, Bath Iron Works, 7 per cent each; Biddle, Bath Iron Works, 4 per cent; Blakely and DeLong, George Lawley & Son, 74 per cent each; Nicholson & O'Brien, Lewis Nixon, 46 per cent each; Shubrick and Stockton, Wm. R. Trigg Co., 75 per cent each; Thornton, Wm. R. Trigg Co., 74 per cent; Tingey, Columbian Iron Works, 42 per cent; Wilkes, Gas Engine & Power Co., 30 per cent.

Submarine torpedo boat—Plunger, Columbian Iron Works, 85 per cent.

NIAGARA RIVER DAM.

Washington, D. C., Feb. 21.—During the past week the committee of rivers and harbors considered the bill introduced by Representative Corliss to construct a dam in the Niagara river for the purpose of raising the level of Lake Erie. Mr. Corliss stated the purpose of the bill. He said that if the dam were constructed it would raise the level of Lake Erie 3 feet and that of Lake St. Clair 2 feet. The chief argument in favor of the dam was made by George Y. Wisner of Detroit, an engineer of the Deep Waterways Commission. Mr. Wisner elaborated upon his argument, the pith of which was published in the Review some weeks ago. He is an earnest advocate of the project and is satisfied that the dam could be constructed without injury to property on the shores of Lake Erie. In his remarks before the committee he said that the range between the maximum and minimum depth of Lake Erie is about 4 feet and that a depth beyond the normal high water mark is not contemplated. He maintains that the dam would not only create a permanent increase of water, but would equalize the depth in each year. The stage of water is lowest in the autumn, and he exhibited a table of figures to show that the carrying capacity of boats would be largely increased by the construction of the dam. The cost of the improvement, as hitherto pointed out, would be well within \$3,000,000.

Maj. Symons, the government engineer at Buffalo, cautioned the committee to act with the utmost deliberation upon the measure. He said that the people of Buffalo knew nothing whatever of the improvement save such fragmentary notices as had been given of it in the newspapers. He pointed to the facts that at one time the winds from the west had increased the volume of water at Buffalo 8 feet and had caused considerable destruction in the lower part of the town. He raised the question as to whether with the dam this volume would not be increased. He did not want to be considered as an opponent of the project, but he thought that the whole subject should be referred to an international commission in order that every possible phase of it might be investigated. The committee took no action.

DEPLORABLE WANT OF LIFE SAVING APPLIANCES.

Editor Marine Review:—New York newspapers of a few days ago (the Sun of the 15th inst.) contained dispatches telling of the loss of six or seven lives on a couple of coal barges, Blossom and Alice Tyron, that foundered off Port Chester, N. Y. The storm was evidently not of a very severe kind but it was noted that the captain of one of the barges, in trying to get ashore for assistance in a worthless old yawl, was drowned, while the barges went down with their occupants—a woman and two children on one of them—behind him.

I am in a position to know and say that there is not a barge—and there are many of them—being towed down Long Island sound or elsewhere in this vicinity that are provided with suitable boats or the means of launching them should an occasion arise. Why is this the case? Are these barges inspected? Is there any law that will compel them to provide proper means for the safety of the crews they carry? If not, ought not something to be done that will force the owners to adopt means that will give the crews of these vessels one chance in a thousand to escape when they encounter heavy weather. As it is explained that these vessels were lost after being towed inside the breakwater, the conditions were evidently such that the crew having a suitable boat with davits and detaching gear could have cleared the barge and would probably have reached the shore or have been picked up by some passing craft. It is certain that sufficient care is not given to this subject and if there are any officers of the government having these matters in charge and who neglect their duty they should be severely censured. The best means known for the purpose of launching boats are none too good and their use should be enforced.

New York City, Feb. 20, 1900

FLETCHER ROBINSON.

The Penn Bridge Co. of Beaver Falls is the lowest bidder, at \$29,737, for constructing a machine shop building at the Mare Island navy yard.

REVISED SAULT RIVER RULES.

As announced at the last meeting of the Lake Carriers' Association in Detroit, certain changes in the navigation rules of the St. Mary's river, suggested by Capt. A. B. Davis, who is in charge of the United States revenue cutter patrol service on the river, were approved by the vessel owners and have since been promulgated by the secretary of war. The changes are not of a radical kind, but it would be well for all ship masters to secure from collectors of customs or from Capt. A. B. Davis, who is located at Milwaukee during the winter, a copy of the latest government circular on the subject, which contains the rules in full as revised. For the facilitation of speed calculations in connection with the rules there is published in the circular the following table of distances, together with the time required to run those distances at a speed of 9 miles per hour:

Sections.	Distance in statute miles.	Time in minutes.
Mud lake buoy to Everens point.....	2 $\frac{3}{8}$	17 $\frac{1}{2}$
Everens point to Encampment crib light.....	$\frac{3}{4}$	5
Encampment crib light to Dark Hole turn.....	1 $\frac{1}{2}$	11
Dark Hole turn to Harwood point turn.....	3 $\frac{1}{4}$	21 $\frac{3}{4}$
Harwood point turn to Junction buoy, Hay lake.....	3 $\frac{1}{4}$	21 $\frac{3}{4}$
Junction buoy to upper lights, lower cut.....	2 $\frac{3}{4}$	18 $\frac{3}{4}$
Lower cut to Frechette cut, full speed.....
Lower range, Frechette cut, to red can buoy.....	1 $\frac{1}{2}$	10
Red can buoy to lower light, Little Rapids.....	1 $\frac{1}{2}$	10
Lower light to north entrance light house.....	1 $\frac{1}{2}$	10
North entrance light house to government pier.....	1 $\frac{1}{2}$	11
West end of pier to Big point.....	2 $\frac{1}{4}$	15
Big point to Point aux Pins light house.....	3 $\frac{1}{4}$	21 $\frac{3}{4}$
Through dike.....	1 $\frac{1}{2}$	7 $\frac{1}{2}$
Through island cut.....	1 $\frac{1}{2}$	7 $\frac{1}{2}$
Least towing time allowed vessels bound up through dike and island cut.....	22 $\frac{1}{2}$

NOTES OF NEW WORK IN THE SHIP YARDS.

There is every prospect of a lively season in wooden ship building at the port of Thomaston, Me. The firm of Dunn & Elliott has leased the ship yard adjoining their own, formerly operated by J. O. Cushing & Co., and will build two or more 1,200-ton vessels. Washburn Bros. have a four-masted schooner of 1,200 tons almost completed and another of several hundred tons in process of construction. They have the contracts for two other large schooners to be completed during the present year and in addition have purchased the mould of the schooner Susie M. Plummer from which a vessel will be built if satisfactory arrangements can be made regarding material.

A very flattering offer was made a few days ago to the Wm. R. Trigg Co. of Richmond, Va., to remove their ship building plant to Alexandria, Va. The proposition contemplates a consolidation of the Trigg works with the present ship yards at Alexandria. The Trigg officials do not seem to regard the proposition with any great degree of favor. The Trigg company has during the past week been requested to submit bids on two additional vessels. One is a passenger and freight steamer for the Old Dominion Steamship Co. and the other is for a large freight steamer for the Lehigh Valley Railroad Co.

McKay & Dix of New York City have concluded negotiations for the lease of the Beasley ship yard at Buckport, Me., for a term of years. The firm will at once begin the building of one three-masted wooden schooner and two four-masted vessels for the Greenland trade. They will employ 150 men.

Percy & Small of Bath, Me., have in the schooner Helen A. Martin, which has just reached the launching stage, one of the handsomest vessels as yet turned out from their yard. She is 205 feet in length, 45 feet beam and 21 $\frac{1}{2}$ feet deep.

Thomas Kirby & Sons, of St. Michaels, Md., are preparing to lay the keel for a schooner of 75 feet length, 2 $\frac{1}{2}$ feet beam and 5 $\frac{1}{2}$ feet depth of hold. The firm is also building two electric launch hulls for parties in Baltimore.

George Ryan of Oskosh, Wis., has the tugs Wolf and Fox, building for the United States government, well along toward completion.

COMPRESSED AIR ON SHIPBOARD.

Chicago, Feb. 21.—Accredited representatives of a foreign government have just had a conference with the president of the Chicago Pneumatic Tool Co., relative to compressed air equipment for its navy yards and larger men-of-war. What the result of this meeting will be cannot yet be definitely given out, as it necessarily requires some time to complete plans and figures. However, the great advantages of pneumatic appliances is shown in the recent United States men-of-war, as well as in the latest additions to the Japanese navy. One of the heads of an establishment of this city that is interested on a very large scale in the development of pneumatic machines says:

"It cannot but be patent that on board ship where ventilation is largely artificial a form of power which all aid towards securing of pure air is preferable to one that vitiates the atmosphere. Heat on the modern man-of-war is generally troublesome, and with steam for power transmission to various parts of the vessels they are in some of their parts almost unbearable. Compressed air permits of the use of powerful tools in any part of ship and it is also highly valuable for under-water repairs. This ability to take care of minor accidents to the hull is of the greatest value where docks are not available. All modern vessels are provided with water tight compartments. Frequently an accident will cause several of these divisions to become filled with water. Compressed air, besides giving the widest scope in use of tools and machinery, would be of service in maintaining an air pressure in these compartments sufficient to drive out the water, and it is safe to predict that the largest of the ocean-going vessels will soon be equipped with air compressing plants and the attendant appliances."

The current number of the Canadian magazine contains a highly complimentary biographical sketch of Mr. J. Stuart Thomson, assistant manager of the Plant Steamship Co. Mr. Thomson gives much of his spare time to literary work. He has published several volumes and has another ready for issuance at an early date.

THE SHIPPING BILL.

FAVORABLE REPORTS TO BOTH HOUSES ARE LOOKED FOR SHORTLY—A VERY STRONG AND INTERESTING INTERVIEW WITH MR. THEODORE C. SEARCH, PRESIDENT OF THE AMERICAN ASSOCIATION OF MANUFACTURERS.

The house committee on merchant marine and the senate committee on commerce are giving constant attention to the shipping bill and is quite likely to be reported favorably to both bodies early in the session. Mr. Theodore C. Search of Philadelphia, president of the National Association of Manufacturers, who recently appeared before the committee in favor of the bill, has submitted to an interview in order to correct certain statements which have lately appeared in the Washington papers.

"There is one statement which I have frequently seen," said Mr. Search, "that I think is an unfair manner of expression, and designed to appall people with regard to the scope of this bill, I refer to what I would call a figure of speech, used in saying that the bill proposes to appropriate \$180,000,000. During twenty years it is proposed to pay a sum not to exceed \$9,000,000 in any one year, and it is well known to all who have made even a superficial study of the question that it will be a number of years before the maximum sum of \$9,000,000 will be absorbed by the existing and new shipping that will have to be built. Suppose the expenses of the government for a period of twenty years to come should be lumped and spoken of in one sum. It would appall the general public in the same way, and the aggregate sum would be one that would stagger the most expert financiers of the country. Or if it be proper to use the sum of \$180,000,000 for the purposes of explanation, then, in fairness, it is proper that the sum that is intended should be saved should be lumped in the same way. We are now paying about \$200,000,000 a year in freight and passenger rates to foreign ships. Lumped for a period of twenty years, we have the enormous sum of \$4,000,000,000, which sum the expenditure of \$180,000,000 is designed, in large part, to retain in the United States by inducing American citizens to build and own ships needed for our foreign carrying trade. But these great figures are beyond the understanding of the general reader, and so it is reduced to the proposed expenditure of not to exceed \$9,000,000 in one year, the object being to effect the saving of the larger part, if not all, in time, of the \$200,000,000 we are now annually sending abroad in payment of our ocean transportation bill.

OVER FOUR BILLIONS PAID TO FOREIGNERS.

"Again conservative estimates place the sum paid to foreign ships by the American people during the last thirty-five years at \$4,000,000,000, while it is believed that the expenditure of say \$150,000,000 in aiding American ships to do our foreign carrying during that period would have resulted in keeping the large part, if not all, of that vast sum at home as a part today of our national wealth. It should be understood that none of these payments can be made unless cargoes are carried under the American flag, or ships are built in the United States, and the expenditure of \$9,000,000 a year to accomplish this result is a small contribution to the general defense of the country and the prosperity of its people, both of which are involved in the proposition to build the ships in the United States our commerce requires, and run them under our own flag. It is entirely consistent with the past progress of the United States in all lines of manufacturing enterprise to believe that under the spur of this bill, during a period of twenty years, methods in ship yards will have developed to such a degree of accuracy and high efficiency as to give this country at the end of that time such proficiency in the branch of trade as to give us the building of the ships needed not only for our own trade, but for that of other nations besides."

The National Association of Manufacturers, of which Mr. Search is the president as stated, is composed of over 1,200 of the largest manufacturing concerns of the country, and is especially interested in the development of new foreign markets and has established and is maintaining at its own expense, a warehouse in Venezuela for the last three years, where American goods are exhibited. The association is today establishing another warehouse in Shanghai, China, not only for the exhibition but for the sale of American goods.

"A consideration of these facts," said Mr. Search, "has caused them to be interested in American shipping, it being accepted as a truism that unless new lines of ships are established, and under the American flag, and unless freight vessels of our own construction are built and put into the foreign trade, the expansion of our export commerce will be restricted and the opportunity for increased employment of our skilled workmen unnecessarily abridged.

SOUTH AMERICA VIA ENGLAND.

"They have not forgotten," continued Mr. Search, speaking of his associates, "their experience of four years ago in sending a committee to South America, and in order to reach there in the most comfortable manner and quickest possible time they were compelled to go to England before they could secure the ship that would take them to Buenos Ayres. It is my belief that the passage of this bill will encourage the creation of rapid intercourse between the United States and the other portions of America. The lack of this rapid communication is the missing link between the great producing country of the United States and the great consuming countries of South America. One is the buyer from force of circumstances, and the other a seller for like reasons, and good judgment in business affairs properly directed would bring them together.

"The thought which is uppermost in the minds of a few, and often those who give but little of careful consideration to this subject, is that it matters little under which flag our goods are carried, so long as they are carried the cheapest. I consider this to be the expression of an unpatriotic feeling, and an expression of feeling which I am persuaded does not obtain among the people of other countries. If our foreign commerce is carried in foreign ships, manned by foreigners and owned by foreigners, not a dollar that is paid them stays in the United States—every dollar goes abroad. If the ship is built in the United States and is owned and manned by Americans, then everything she earns remains in the United States, employing our own people over and over again. It makes every difference, as will be seen, under which flag it is carried. Doubtless we are all ruled to a greater or less extent by the cost of the operations we conduct, but when it is as easy to conduct those operations under our own

flag as to do it under that of a foreign nation, I am sure that American patriotism repels the thought that it makes no difference. Nor do I consider this expression of patriotism as belonging solely to the American people. I believe that the people of all nations would look upon the subject in the light that I have suggested. Besides this, so far as self-interest is concerned, once our shipbuilders have been given constant employment by the creation of a demand for American-built ships for a period of years, they will, through home competition and natural bend, have introduced such economies into construction as to bring the cost of our ships as low, if not lower, than can be built elsewhere, and this without in any way reducing the wages paid to our skilled mechanics. The ship owners, too, will be constantly spurred to effect economies in operation that, in the end, will give them a permanent command of our carrying trade at rates of transportation as low, if not lower, than the ships of other nations can offer. Then the country will have all of the advantages of these vessels and their men in the time when the nation may be compelled to face an armed foreign enemy.

WHERE ARE THEY BEING BUILT?

"I notice, too," Mr. Search continued, referring to an article which he had but recently read, "that it is said that Mr. James J. Hill of the Great Northern Railroad is building a large number of ships for our Pacific trade with the Orient and that he intends to build many more. I have been curious to know where these ships are being built. I am sure that if any American ship builder has received the order for these great ships due attention would have long ago been drawn to the fact. I am compelled to assume that, if building at all, they are under construction in foreign ship yards. It is the very thing that we are complaining of and trying by legislation to remedy—the ability of the foreigners to at present build ships cheaper than our ship builders can build them; besides which they are run cheaper under foreign flags. While welcoming all additions to our carriers on the Pacific, I regret that this bill is not already in operation, so that Mr. Hill could find it to his advantage to build his ships in this country and run them with Americans under our own flag.

"Another thing I noticed," concluded Mr. Search, "and which I cannot leave this subject without alluding to, is the attacks that are being made upon our only line in the trans-Atlantic trade, a line that is making fair headway against rivals which possess numerous advantages denied to this one line under the American flag. Nowhere is the competition so fierce as it is in the North Atlantic trade; nowhere are giant companies, backed by enormous capital, striving with greater energy to grasp and retain control of routes and trade so industriously as there. It requires men of iron will, fortified with almost unlimited means, and with every faculty constantly alert, to meet the competition of rivals, to make headway in that competition. And yet our one company, struggling against almost overwhelming odds, is singled out for the great brunt of the abuse heaped upon those advocating the passage of this bill. I say this is unjust, and the animus, as well as the source of attack, it seems to me, are apparent to all. I do not claim to be an expert or versed in the technicality of building or running ships and so am unable to discuss the proper distribution of this national bounty, but this I do know, as a result of attending some of the public hearings given on this bill, that it is demonstrated not alone upon the word of the president of the line I am alluding to, but by other equally competent experts, that the rates of compensation accorded to his ships were only fairly apportioned in the bill as originally drawn and that the changes that have been made in response to the demands of those on the outside have resulted in reductions and restrictions upon this one line that have already passed the danger point and actually menaced the existence of the only line we have on the Atlantic in our trade with Europe running under our flag. What could the enemies of this bill and of American shipping so hope and work for as the destruction of that one audacious but gallant American line in the trans-Atlantic? What should the patriotic pride of our people be so stirred to prevent, at whatever cost, than such a consummation? If the rates of payment to this line are too high, the terms of the bill, I well remember, permit any one who chooses to engage in direct competition with that line under our flag, and the competitor, ship for ship, will receive precisely the compensation that the existing line receives.

AN IMPORTANT PROVISION.

"Another point in connection with this bill, too often overlooked, and of great importance, is the provision that when the number of ships under the American flag is sufficient to earn the maximum compensation allowed in any one year, then the new ships that come in have the effect of reducing the compensation paid to all the others, in order that the last shall share equally with all the others. The effect of this, it will be apparent, is to increase the number of ships, as their cost price is reduced, while diminishing their individual, but not the aggregate payments. In time, under the sliding scale of reduced compensation and increased shipping, the final withdrawal of the bounty will not work such a hardship as would be the case were the maximum rates of compensation summarily discontinued. And last of all," added Mr. Search, impressively, "this particular feature of the bill absolutely destroys the possibility of any monopoly of any route or character of trade. There are no favored lines or ships under this bill. But all receive the same compensation, size and speed being equal, and none is restricted to any particular route, while all routes are equally open to each ship or line.

"A bill as scientific and as equitable as this, in my judgment, has never before been introduced in any legislative body in the world, and its complete adaptation to existing and pressing American needs is one of the strongest reasons why it should be passed, and passed now."

WHAT ABOUT CHECK SIGNAL?

Editor Marine Review:—The new code of whistles and bells for the great lakes is all right, but I hope some one will inform us as to how we can check a boat when we desire to do so. As there is no check signal in the new code I have been wondering how they expect a man to go slow in the "Soo" river, through the St. Clair flats cut or Limekilns cut. I suppose we have no right to use three whistles or three bells. We would all like some information as to what we are to do when we desire to check.

T. A. ELLERY.

Marysville, Mich., Feb. 19, 1900.

ICE-BREAKING STEAMERS.

THEY ARE STILL A SUBJECT OF SPECIAL INTEREST AT MEETINGS OF ENGINEERING SOCIETIES—A PAPER DEALING WITH SOME OF THE LARGEST OF THEM.

The ice-breaking type of steamer as exemplified in the large car ferries in service on the great lakes and more latterly, and perhaps more strikingly, by the Ermak, which was constructed in England a year or two ago for the Russian government, still attracts its full share of attention at the meetings of the engineering societies. At the last meeting of the Institution of Civil Engineers in London the principal paper presented was that by Mr. Robert Runeberg on the subject "Steamers for Winter Navigation and Ice-Breaking."

The author pointed out the considerable development, during recent years, in winter navigation. Many harbors formerly closed for several months in the year, were now kept open by means of one or more ice-breakers, and navigation was rendered possible, often the whole year round. It was most important, however, that trading steamers should be adapted to the peculiar conditions under which they worked. Winter navigation, which was very hazardous with ships not suitably designed and also badly equipped, was now becoming comparatively safe since specially designed boats had been used. The gradual transformation of the lines of the European ice-breaker was illustrated, beginning with the prototype Eisbrecher I. built in Hamburg in 1871, having the bow rounded like a spoon. The lines of several ice-breakers showed how this spoon form gradually gave place to a sharper bow with S-formed water lines and more sloping buttock lines. This was most perceptible in the Ledokol, built to the author's design in 1895. The advantage of this modification was now fully established. The resistance of ice was variable, depending on the temperature and the manner in which the ice had been formed. It was, therefore, hopeless to arrive at a very exact formula for the ice-breaking capacity of a steamer. Snow also gave great resistance, especially to a rounded bow.

An interesting ice formation was sometimes observed in salt water. When the temperature of the atmosphere was low, the surface water cooled and sank, warmer water rising to take its place, and thus circulation was established which might cool the water below freezing point to a considerable depth, salt water having its greatest density at a temperature below zero. If now the equilibrium of the particles was disturbed, a spontaneous formation of ice took place throughout the whole mass of water cooled below the freezing point. The newly formed particles of ice rose to the surface in a more or less thick layer without any solidity. Gradually this mass would freeze together, but it was difficult to say if ice formed in this manner ever attained the same strength as the surface ice.

The tests of the resistance of ice were not yet sufficiently exhaustive. Frühling of Königsberg found the resistance to vary between 15 kilograms and 27.26 kilograms per square centimetre; Ludlow of Philadelphia between 23 and 70.7 kilograms per square centimetre; and Kolster of Helsingfors between 28 and 68 kilograms per square centimetre. With the gradual increase in the power of modern ice-breakers, it had become evident that evenly laid and uniform ice no longer presented any serious hindrance to winter navigation, but the great problem was now how to clear the pack ice which, in the Baltic, reached to a depth of several fathoms.

It had often been observed that a steamer going astern sometimes made better progress than going ahead. This gave Mr. Frank E. Kirby of Detroit, Mich., the idea of constructing a steamer with one propeller at each end, and thus originated the American type of ferryboat for winter navigation. The first steamer built on this system was completed at Detroit in 1888 for carrying railway trains across the Straits of Mackinac. The method by which this new craft worked in pack ice was somewhat different from the European method. When an ice-breaker of the old type was stopped by a belt of pack ice she backed astern a few ship's lengths and made a fresh charge; but the American steamer remained with its bow against the ice, the fore engines were reversed, and the fore propeller sent a stream of water in among the pack ice, loosening the hold between the separate blocks; and as soon as the engines were again reversed, lumps of ice were carried aft by the stream from the fore propeller. The aft engines were, during this operation, constantly working forwards, and, having greater power than the fore engines, kept the boat against the ice.

This boat having proved a success, others followed, and the good results obtained with the American railway ferries were soon appreciated in Europe. The Trans-Siberian railway ordered one steam ferry of 3,700 horse power for the Baikal lake, and the Finland government decided on having one ice-breaking steamer for the Port of Hangö, with a propeller in the fore end. This steamer, the Sampo, had now finished her first winter's campaign, and had proved quite satisfactory. The most prominent advantage of this new type over the old one seemed to be

that a snow cover on the ice did not appreciably increase the resistance offered by the ice to the progress of the boat.

The Ermak of 10,000 indicated horse power was the latest addition to the list of ice-breakers with a propeller at the fore end. This boat was intended to assist in opening the navigation to St. Petersburg in the winter, and to the great Siberian rivers in the summer. Her principal dimensions were 305 feet by 71 feet by 42 feet 6 inches. The author pointed out the fallacy of giving too great inclination of the sides at the water line, this not being necessary, as was proved by experience gained with a number of renowned ice-breakers. The greater inclination could not be obtained without serious sacrifices. The V-shaped midship section meant increase of dimensions to compensate for the loss in midship area, and this entailed increased initial cost and inferior handiness in navigation amongst ice, as well as bad sea-going qualities.

The Ermak had returned from her trip to the Arctic ocean; but the results did not seem to have fully realized all expectations, and the author thought that the efficiency would, perhaps, have been greater if the proportion of power on the fore engines had been increased in conformity with the latest American and Finnish practice. The great inclination of the sides had, no doubt, also contributed to the disappointment.

THE KEARSARGE IN COMMISSION.

The battleship Kearsarge was commissioned at 11 o'clock Tuesday morning of this week, Supt. W. A. Post turning the vessel over to her commander, Capt. Folger, who read his orders and formally took command as the flag was hauled up to the

tune of the "Star Spangled Banner," by the naval post band of Norfolk. At the request of Rear Admiral Baker, in charge of the naval station the salute which had been arranged was omitted. The contract for the construction of the Kearsarge was awarded to the Newport News Ship Building & Dry Dock Co. in January, 1896, and she was launched in March, 1898. The contract price was \$2,250,000. The battleship had her official trial over the Cape Ann course on Sept. 25, 1899, with weather fairly favorable and with an attendant success very marked, the average speed being 16.816 knots. The contract requirement was only 16 knots. The dimensions of the Kearsarge are: Length between perpendiculars, 368 feet; length over all, 375 feet 4½ inches; extreme beam, 72 feet 2½ inches; displacement on trial, 11,500 tons; engines and boilers—twin screw vertical triple expansion and Scotch.

The list of officers detailed for duty on board the Kearsarge is as follows: Captain William M. Folger, commanding, Lieut.-Commander Greenleaf Merriam, executive, Lieut. Commander Nathaniel R. Usher, navigator, Lieut. Horace W. Harrison, Lieut. Carl W. Jungen, Lieut. Emil Theiss, Lieut. Ryland D. Tisdale, Lieut. John M. Poyer, Lieut. (junior grade) Joseph M. Reeves, Surgeon Howard E. Ames, Paymaster William J. Littell, Capt. T. P. Kane, U. S. M. C., Acting Gunner Clarence S. Vanderbeck, Acting Gunner John H. Lohman, Acting Carpenter Thomas W. Richards, Acting Warrant Machinist Otto Johnson, Acting Warrant Machinist Martin Casey, Acting Warrant Machinist William J. Trevor, Paymaster's Clerk B. L. Lankford.

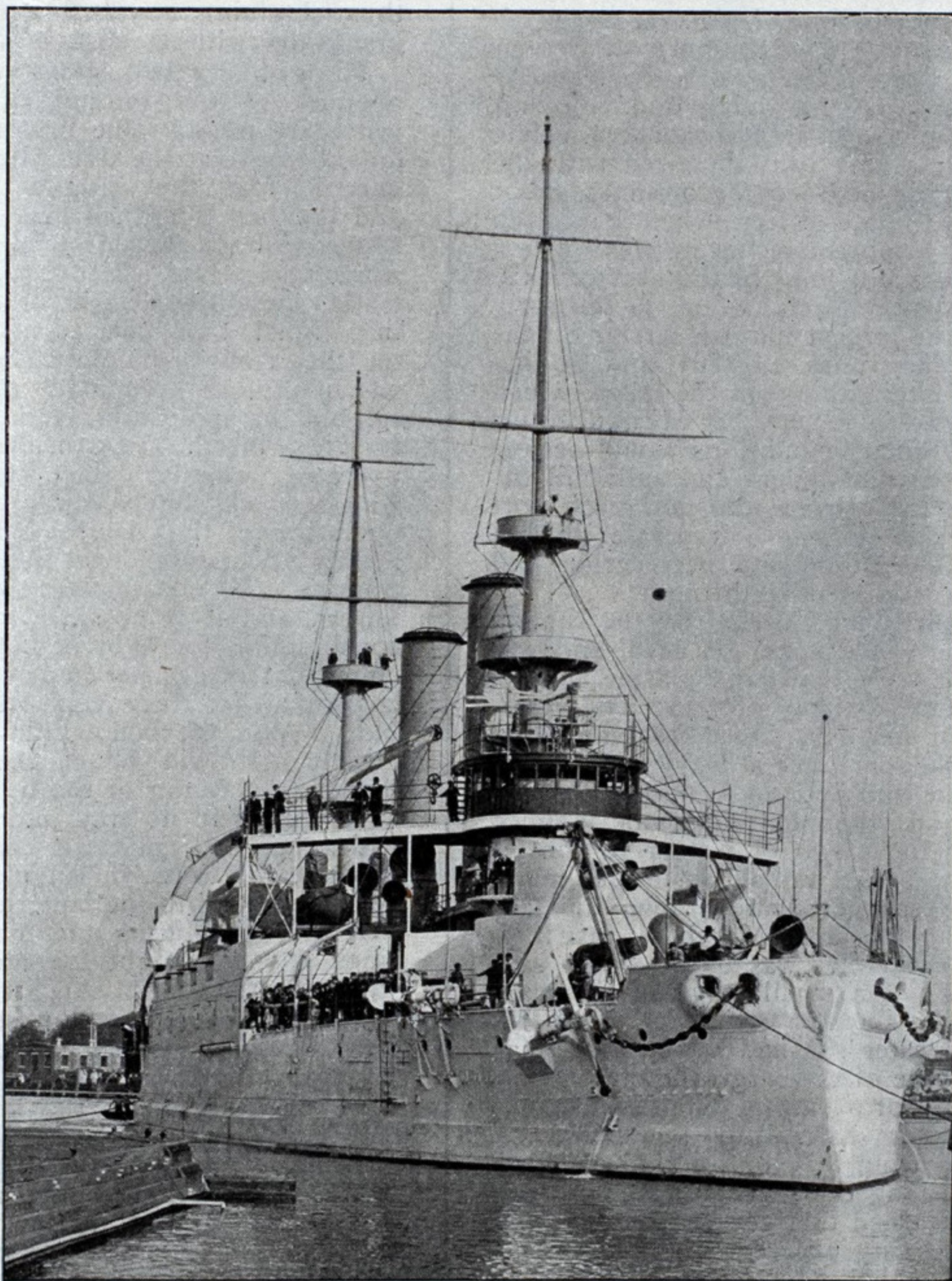
A new site for a coaling station for vessels trading to Chesapeake bay has been proposed and is meeting with much favor. It is at Church Point on St. Mary's river. St. Mary's river is a branch of the Potomac and has a splen-

did natural channel ranging from 35 to 45 feet in depth, extending the entire distance from the sea to the point and affording plenty of water for the largest battleships afloat. The river is said to form an excellent natural harbor and on account of its close proximity to the sea the water is sufficiently salt to prevent freezing, even in the coldest weather. The point is 60 miles distant from Cape Henry and coal could easily be brought there on barges from Baltimore or Norfolk, or by the new railroad, a bill for the construction of which is pending in the legislature.

AND WE HAVE NO SHIPS.

Fairplay of London, issue of Feb. 8, referring to the demand for ships on our Atlantic seaboard says:

"America has already come forward at advanced rates for grain, cotton, etc., and a considerable volume of business has been done. Grain freights show a further hardening tendency, and there is every indication of that resumption of business on a large scale which it was anticipated would be seen before the end of last month. The cotton charterers have had to put up their rates considerably to secure tonnage, and active chartering is now in progress. How far the effect of this general demand for tonnage from the Atlantic ports will stimulate homeward freights generally remains to be seen, but in all probability it will be felt in all directions. America is, of course, a most important factor in the freight markets, and it is distinctly encouraging to notice the rates creeping up and the widening scope of the inquiries for tonnage."



A MODERN BATTLESHIP.

THE NEW KEARSARGE, JUST PLACED IN COMMISSION AT NORFOLK NAVY YARD.

GOODRICH COMPANY'S NEW SUPERINTENDENT.

Chicago, Ill., Feb. 21—Capt. David Mitchell Cochrane, who was last week appointed superintendent of the Goodrich Transportation Co., to succeed the late Capt. John W. Gillman, is so well fitted for the place that his appointment will undoubtedly be looked upon favorably, both by the traveling public and the Goodrich line employees. He is widely known, and a genial whole-



souled disposition has made for him a host of friends, the more intimate of them always addressing him as "Captain Dave." If diplomacy is the art of concealing one's dislikes then the captain has it in a large degree. Meeting the traveling public in an official capacity will not be a new duty with Capt. Cochrane, as he was commodore of the World's Fair Steamship Co. during the exposition in 1893 and had charge of that company's ships until the fair was closed. It was Capt. Cochrane who inaugurated at that time the dollar round trips between Chicago and Milwaukee.

The captain's career on the lakes is too well known for extended notice, but a brief biographical sketch will not be out of place at the present time. He was born of Scotch parentage at Oswego, N. Y. His mother is still living and enjoying good health at Milwaukee. While quite young he was seized with the

worthy ambition—so common among hardy boys—of becoming a sailor and in time a commander. He was not quite fifteen when he began sailing on salt water. After the necessary apprenticeship he was made a river pilot out of New York. But he was not long in the service. He soon came to the lakes, locating at Manistee, Mich., where in the early sixties he was master of the Bismarck, the largest lumber carrier on the lakes. His first command was the Orkney Lass, in 1864, and in that vessel he had his first experience with winter sailing on the lakes, which in later years he followed assiduously. He took wheat at Milwaukee for Kingston on Nov. 30. This trip under ordinary conditions would occupy a week, but meeting with strong adverse winds, sleet and snow all the way through Lake Huron and Erie, Capt. Cochrane did not reach port until Dec. 18, being out nearly three weeks. It was a desperately trying trip for a young master, but undaunted courage and persevering will power, coupled with skillful seamanship, carried him through.

Another of the many rough experiences encountered by the captain was on the Messenger, which left Grand Haven Jan. 29, 1873, and was almost immediately caught in an ice floe. She had land plaster aboard, about ten barrels of flour and a very limited supply of rice. The vessel was held in the ice, solidly frozen in for ten days, then breaking loose and worked to within five miles off Muskegon. But a heavy mass of ice drifted against her and stove a hole in the hull about 4 feet square. Captain Cochrane caused a lot of bedding and other material to be jammed into the break and moved a portion of the cargo of plaster to the lee side, thereby listing the vessel so that the break was above the ice mark, and it was then planked over. The Messenger drifted down the lake until almost off Manistee, but she was not free until March 24, just fifty-four days out. During thirty-five days the boiler was blown off to save fuel, the only fires on board being those of a small stove in the wash room and that in the galley three times a day for cooking. When the Messenger was at last free and in open water she had barely four small barrels of coal and but for the flour and rice of the cargo the crew would have been in hard straits on the score of provisions. The meat supply was exhausted early, and it was two weeks before any one could get ashore over the ice for a fresh supply. During this long period of "iceolated" exclusiveness, Capt. Cochrane managed to get ashore and call on the owners in Milwaukee and there learned that several attempts had been made to send the Ironsides and the City of Fremont to his assistance, but he advised them to make no further attempts of this kind as they would be futile; he would manage some way to bring the Messenger off in time, and he did.

In 1874 Capt. Cochrane had another rough experience on the Forest City between Grand Haven and Milwaukee, whom a 60-mile blizzard came up and the thermometer dropped to 10 degrees below zero, but after a dangerous, protracted struggle he reached Milwaukee with about 300 tons of ice hanging over and around his ship. He was out in the storms in which the Lac la Belle, Ironsides and Wells Burt were lost. He has never lost a vessel.

Capt. Cochrane left the Messenger for the Minneapolis, then for the side-wheeler Flora and later for the John A. Dix, which he afterwards purchased (in 1884) and operated in excursion business out of Chicago. Capt. Cochrane began service with the Goodrich line in 1897 and has been master of several of their vessels, so that he is familiar with the routes and business of the company. His home is at 3530 Ellis avenue, Chicago. He has a family of six sons and three daughters. Several of whom are married and have left the paternal roof.

The project of a number of capitalists headed by Collis P. Huntington to erect at Newport News, Va., in connection with the large ship yard at that point, a large plant for the manufacture of steel plate and ordnance is said to have been dropped for the present. The latest report on this score is that the gentlemen interested desire to await the outcome of the Carnegie-Frick trouble. It is also said that Mr. Frick has had the question of an armor plant under consideration with Mr. Huntington. In speaking of the matter a day or two ago Mr. Huntington is quoted as saying, "Such a project has been thought of in connection with our works, but there is nothing that can be said about it now. It may be that this question will be taken up again and that a large plant will be built at Newport News, but any rumors that are circulated about it now are, to say the least, premature."

GAS LIGHT AND BELL BUOY.

BELL ATTACHMENT TO PINTSCH GAS BUOY—IT IS OPERATED PRACTICALLY WITHOUT COST—A NOVEL DEVICE.

BY ROBERT M. DIXON, M. E.*

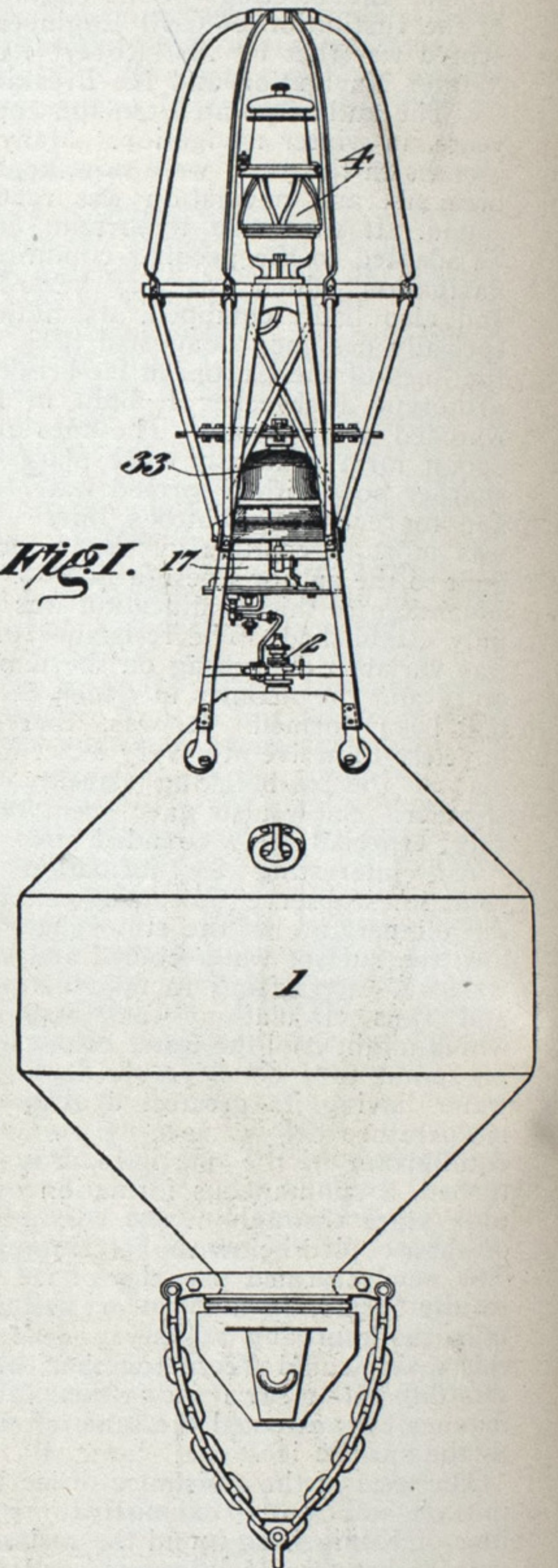
The operation and efficiency of Pintsch gas-lighted buoys is well known throughout the world. The system has been adopted by all civilized countries, and the service given is appreciated as of the most valuable character. The inability, however, of the light to penetrate a thick fog for a considerable distance is now in part compensated by the addition of a bell to the standard buoys, which is sounded by the flow of gas from the reservoir of the buoy to the lantern. It is readily appreciated that the stored gas within the body of the buoy at the initial pressure of 180 pounds per square inch contains a very considerable potential energy, by virtue of the high pressure under which it exists there. This stored energy is utilized for the purpose of sounding the bell, thus obtaining a valuable result practically without cost.

The ordinary bell buoys which operate by the motion of the water are of no value in case of fogs, because at the time of existence of fogs the water is quiet and the bell does not ring until some wash is caused by a boat which has passed. No other automatic sounding device for floating signal than that dependent on the movement of the water has heretofore been made practical, but the application of the bell to the Pintsch buoy mechanism operates whether the sea be rough or absolutely calm. The operation of the device will be readily understood from the illustrations and description which follow, and it is possible with a consumption for light of but one cubic foot of gas per hour in the lantern to get three very forcible blows upon the bell within each minute. It will be understood that the operation of the lighting apparatus is in no way interfered with; that the gas after having expended its force in ringing the bell is supplied to the lantern, and that the light burns and the bell rings day and night for months without attention.

Fig. 1 represents a Pintsch gas buoy equipped with a bell which is rung by the flow of the gas from the buoy body (1) to the lantern (4). The bell (33) is usually located within the tower, although it may be in any convenient place. The gas is led by a pipe from the buoy valve (2) to the inlet of the ringing apparatus, which in the drawing is within the cover (17) and shown in detail in Figs. II and III. The ringing apparatus consists of a vessel, covered by a flexible diaphragm (7), Fig. II, on the under side of which the gas passes through the valve (66). The accumulating pressure of the inflowing gas raises the diaphragm, compressing a spring (22) and lifting the rod (25), which connects to the lever arm (27). The lever arm rotates on the shaft (28), to the other end of which is fastened a spider (29) having three arms. On the ends of these arms are two hammers (30-31) and a counterweight (32). There is also attached to the shaft (29) a lever (36) having a fork with two pivots (39-40), Fig. III, to which are fastened the springs (41-43). As the shaft (29) revolves by the action of the rod (25) the effect of the spring (43) becomes less, and the effect of the spring (41) becomes greater, until the force of the latter overcomes frictional and other resistances, causing the hammer (30) to strike the bell. The shaft has free motion, due to the slotted hole in the upper end of the rod (25).

As the lever (27) moves upward, it carries with it rod (52), operating on crank (53) turning on the shaft (55) to which is also fastened crank (56), operating on rod (59), drawing up lever (61), closing valve (66), and shutting off flow of gas to the space under the diaphragm. The valve is held closed by spring (70). Rod (59) has on it two stops (57) and (58). The flow of the gas to the space under the diaphragm (7) being stopped, the gas is continually forced through the pipe (13) to the lantern by compression of the spring (22); the diaphragm falls, drawing the rod (25) and with it the crank (27), rod (52), crank (53) and arm (36), until the spring (43) has greater pulling effect than spring (41), when the hammers are suddenly drawn to the other side, striking the bell, during the last instant of which action crank (56) strikes stop (58), opening valve (66) and allowing gas to flow under the diaphragm. This illustrates the cycle of operation. The interval occupied in exhausting the gas from the space beneath the diaphragm (7) is controlled by the consumption of gas in the buoy lantern. A bracket (48) holds springs (50) which keep the hammers off the bell after impact.

*Mr. R. M. Dixon is the inventor of this device.



COMBINED GAS LIGHT AND BELL BUOY.

AROUND THE GREAT LAKES.

Another of the 500-foot Wolvin steamers, the James J. Hill, building at the Lorain works of the American Ship Building Co. for American Steel & Wire interests will be launched at 2 p. m. Saturday, the 24th inst.

Capt. W. C. Richardson, vessel owner of Cleveland, has gone south for a well deserved vacation. He was accompanied to Cincinnati by his son-in-law and daughter, Mr. and Mrs. T. H. Paine of Ashtabula, and they will be joined there by friends, going either to Florida or Mexico.

James Corrigan of Cleveland has purchased engines that were removed from the burned hull of the steamer Aurora in the Detroit river some time ago and also two boilers, which he will install in one of his steel barges. He will probably not be able to have the work done until next fall.

Capital of the Richelieu & Ontario Navigation Co., operating a large fleet of passenger and freight steamers on the St. Lawrence, is to be increased by \$348,000. This company has had three or four new steamers in contemplation for some time past and will undoubtedly place a contract shortly for one of them.

It is again announced that the Graham & Morton Transportation Co. of Chicago is to have a new twin-screw passenger steamer of about 215 feet length, costing about \$200,000, for the Chicago-Benton Harbor

TRADE NOTES.

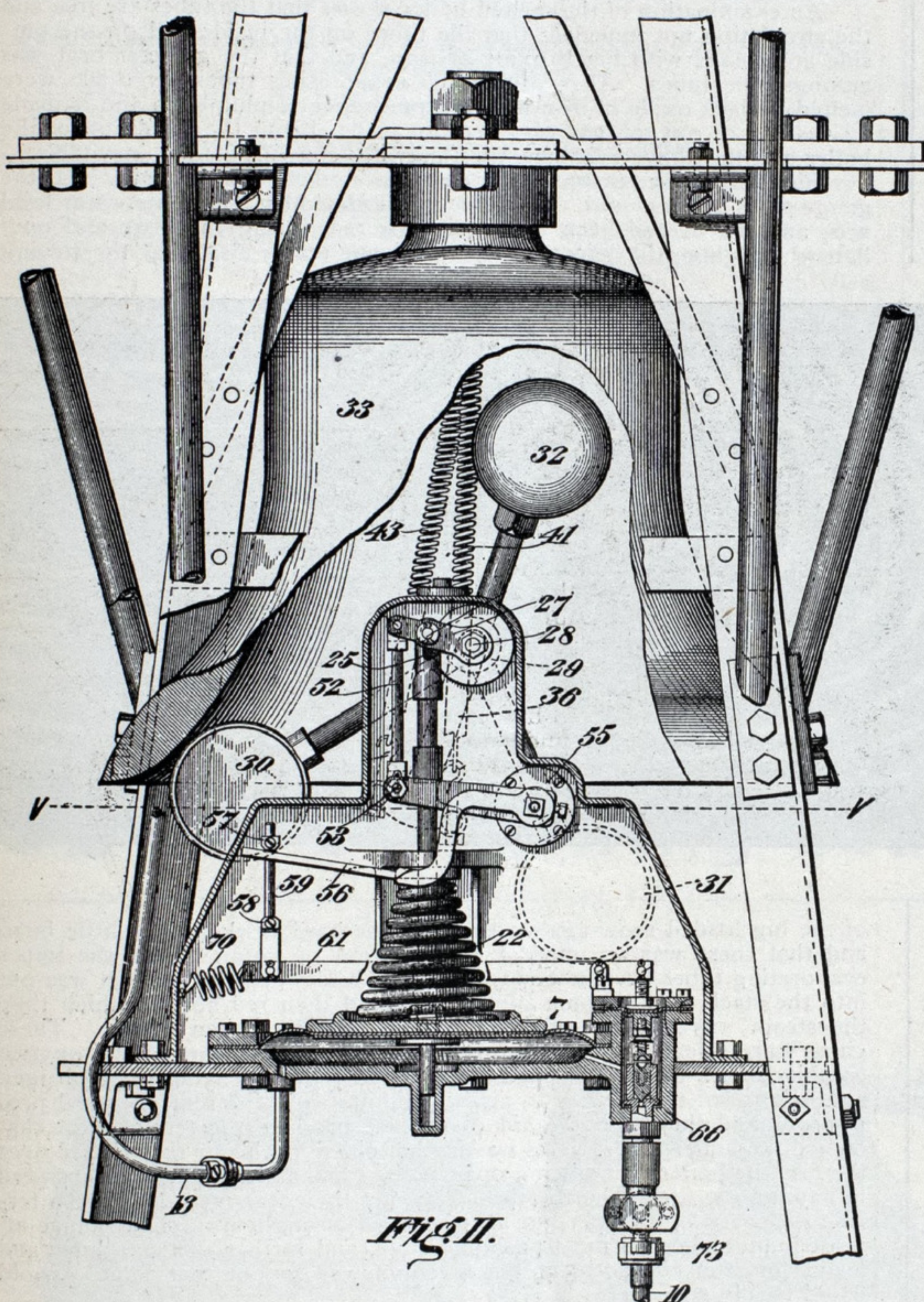
The Gobeille Pattern Co. of Cleveland is making the patterns for the machinery of the torpedo boat destroyers building by the Wm. R. Trigg Co. of Richmond, Va.

Mr. G. W. Peck of Page Bros. & Co., manufacturers of ships' lamps, oil and electric fixtures, has just finished a tour of lake ship yards, where he is as well known as on the Atlantic coast.

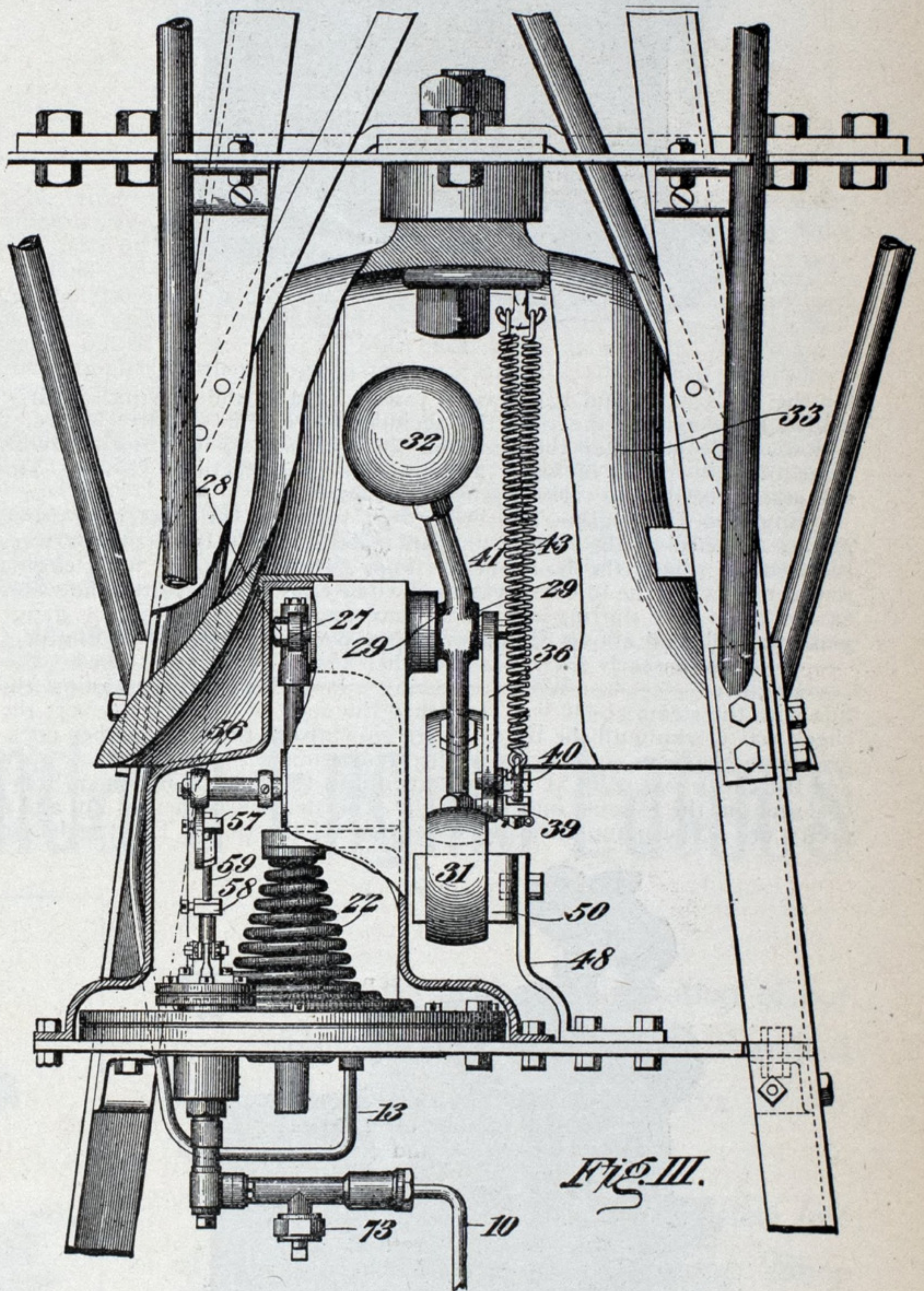
The New York Belting & Packing Co. has ordered a 75 K. W. direct-connected generator for its new factory in Passaic, N. J. The order was placed with the Sprague Electric Co. of New York.

The Sterling Lubricator Co. of 344 Powers building, Rochester, N. Y., introduce in a little leaflet their new and improved force feed lubricator. This is something of an innovation in many respects and the little pamphlet brings out the new points in a clear and convincing manner. Some statistics are given in a supplementary sheet which shows the record of Sterling lubricators.

On the front cover of this issue will be found the advertisement of the American Machinery & Trading Co., a strong organization that undertakes to furnish all lines of first-class equipment required in factories, mills, electric light and power plants, etc. The company also advertises to accept agencies from manufacturers for the sale of machinery in foreign



RINGING DEVICE, FRONT ELEVATION.



RINGING DEVICE, SIDE ELEVATION.

route. It is said that the vessel will be in readiness for the season of 1901, but if the contract has been let the name of the builder is not yet given out.

The Eddy interests are about to move into new offices in the Crapo building that are said to be the finest in the city. These interests include Eddy Bros. & Co., the Penobscot Mining Co., Eddy, Avery & Eddy and the estate of John F. Eddy, each of which will have separate quarters, in addition to the private offices of Selwyn, Charles A., Charles F. and Newell Eddy and John Shaw.

The Lake Michigan & Lake Superior Transportation Co.'s steamer Manitou has been purchased by a newly organized corporation known as the Manitou Steamship Co., which was incorporated a few days ago under the laws of West Virginia with an authorized capital of \$500,000. The new company is composed of Chicago capitalists and the vessel will be continued as an exclusive passenger carrier between Chicago, Mackinac island and intermediate east shore points.

M. W. Fogg, the well known manufacturer of hair and felt mattresses, cushions and bedding, has removed from 18 Fulton street, New York, to 20 Fulton street, where he has more commodious quarters. Mr. Fogg, it will be noted, continues in the same building, which is at the corner of Front street and in close proximity to the headquarters of the shipping interests.

countries. The main offices of the company are in the the Bowling Green building, New York.

The right kind of blotter, one that really soaks up the surplus ink, has been issued by H. Bloomsburg & Co. of Newport News, Va., manufacturers of steam jets and circulators with steam heating attachment for heating and circulating water in steam boilers. The blotter is adorned with four neat small pictures of the steamers City of Lowell, City of Chester, Al. Foster and Brandywine, four modern steamers that use these circulators and jets.

A New York corporation of which Mr. William McAdoo, former assistant secretary of state, is a member, has offered to build for the government a sub-surface torpedo boat, the patents of which are owned by C. L. Berger. The boat is described as suspended a few feet below the surface of the water by a web from a long, low and narrow false-surface hull or float, fitted with cellulose so as to be unsinkable and having a heavily armored conning tower rising from the sub-surface hull through and slightly above the surface hull. The upper hull is never submerged, but rides on the surface. The submerged hull therefore travels with its uppermost position always at the same distance, about 4 feet below the surface. The boat will be fitted with an engine of 900 horse power capable of making 15 knots. A vessel of this kind can be built in eight months and at a cost of \$70,000.

THE WORK OF A CARELESS ENGINEER.

On Dec. 11, 1899, the United States local inspectors of steam vessels in New York investigated the burning (Sept. 13, 1899) of a water tube boiler on the tug William H. Beard. This is a small tug of 28.49 gross tons, employed by the W. H. Beard Dredging Co. in towing mud scows. She was supplied with a Boyer patent sectional water tube boiler in the spring of 1898, and it had given the fullest satisfaction. Soft coal was the fuel used.

The testimony shows that on the night of Sept. 12, the regular engineer, Mr. H. Stiglin, closed the connections between the gauge glass and boiler, as was his custom. That on the morning of 13th, he was sick and employed Engineer _____ to take his place for the day. That shortly before 7 o'clock on the morning of the 13th, the tug left her berth

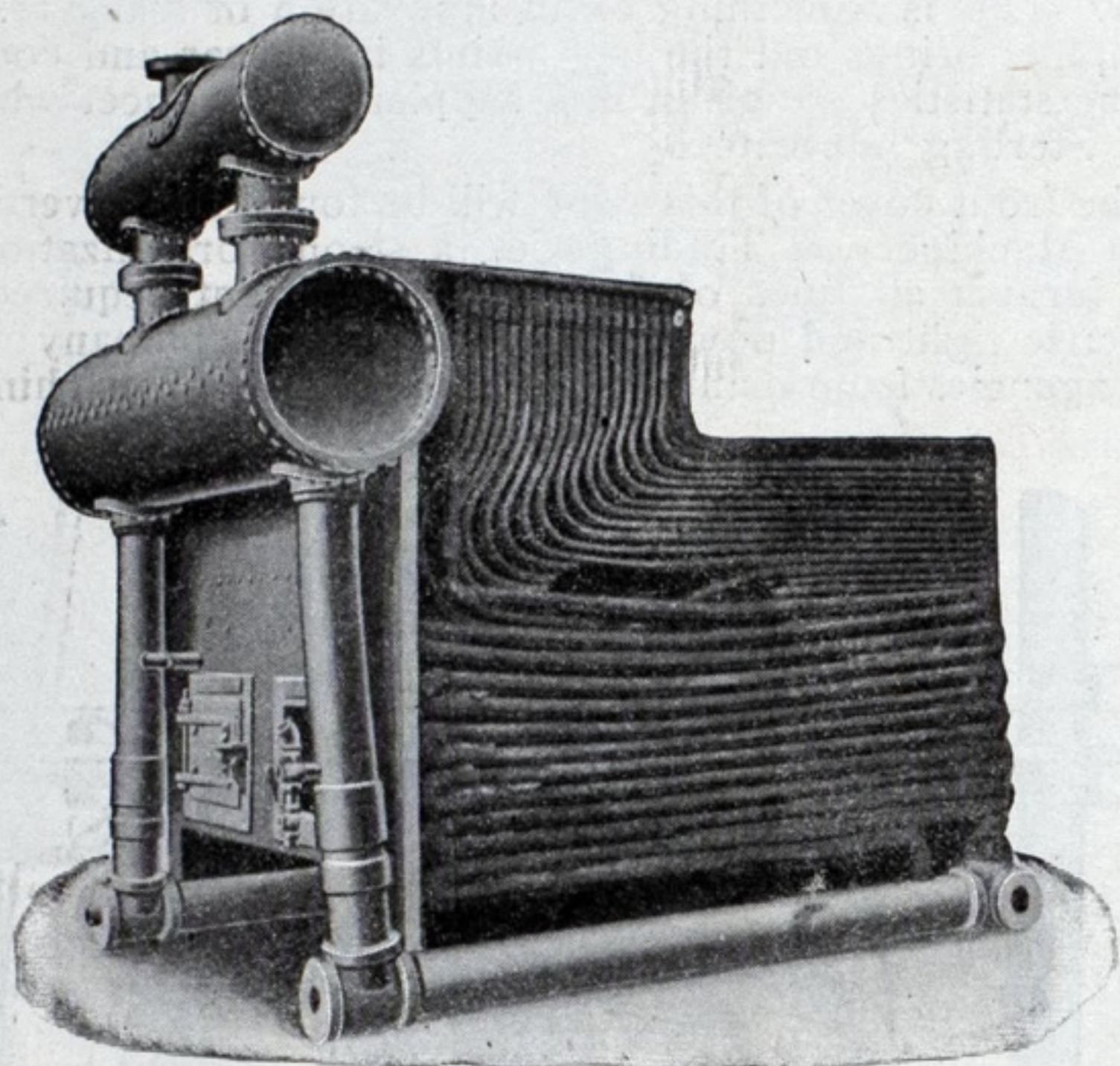


Fig. 1.

for the day's work and had several tows. That while towing a large loaded scow against the tide, the accident occurred, shortly before 1 o'clock. The day after the accident, the gauge glass was noticed with three or four inches of water and the boiler connections closed. The witnesses describe the various points as follows:

Engineer H. Stiglin—The boiler was supplied with water by force pumps attached to the engine and an injector. The force pumps were sufficient to supply the boiler at all times except when the tug's engine was at rest, when the injector was used. The engine never lifted the water except when first starting out in the morning, at which time the gauge glass was full and above the upper gauge cock. I was with Engineer _____ until nearly seven o'clock, when I went home and to bed.

Engineer _____—We were towing a large loaded scow against the tide with the steam at 140 lbs. I opened the cock of the air chamber; the check was working all the time. After blowing off the air chamber cock my steam began to come down. The connection with the tank was open and the check was cold. I jumped down into the fire room, put on fresh coal and put the exhaust into the stack. The steam was then at 110 and a pretty fire. The pump check was working all the time. The tug began

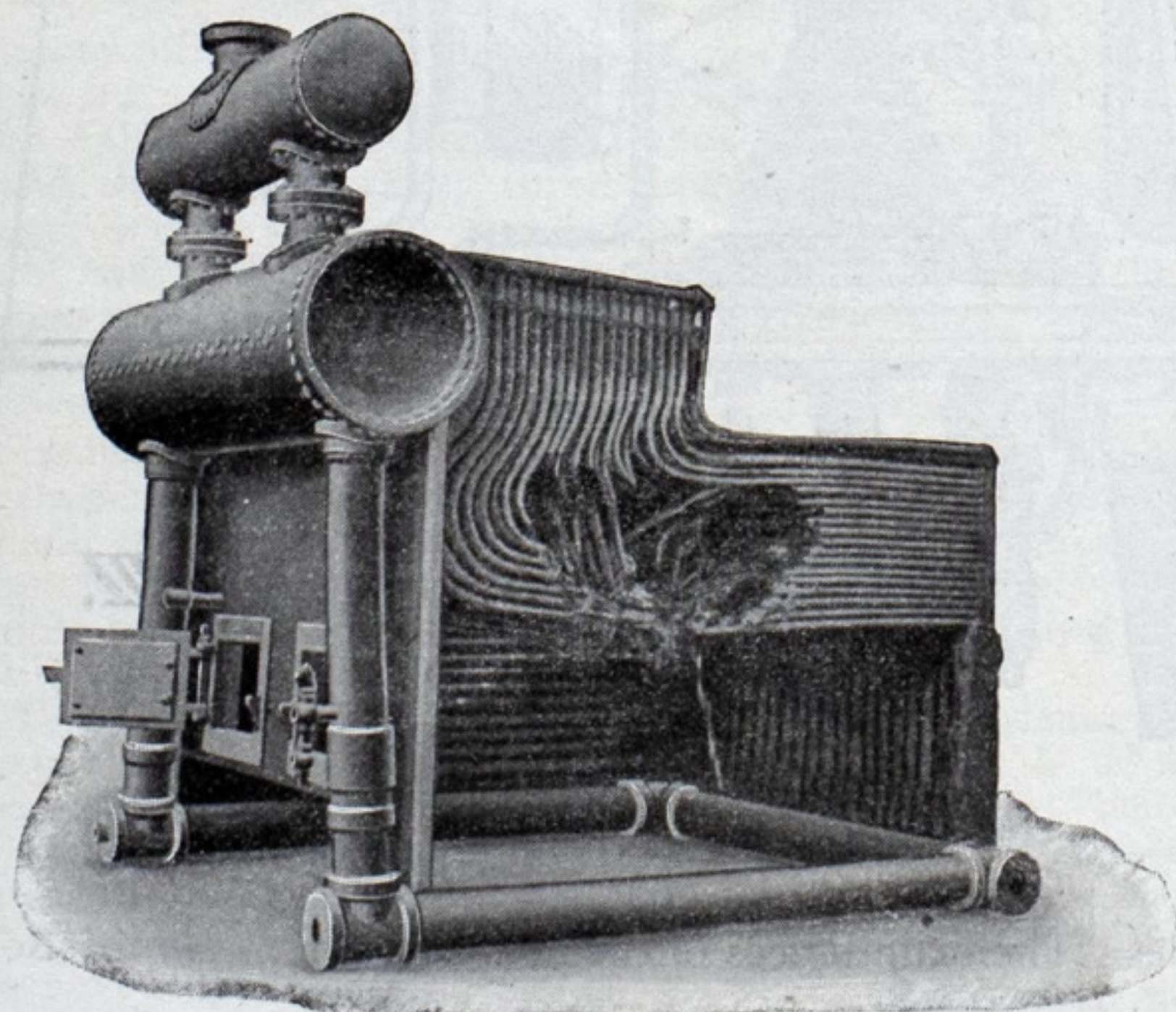


Fig. 2.

to plunge heavily, caused by the swell from some passing steamer. I received a signal to slow and tried to work the injector; it would not force the water into the boiler. I immediately drew the fires and had drawn several hoefuls when I noticed something was dropping down. There was no hissing or blowing of water or steam.

Superintendent W. H. Arnold, of the W. H. Beard Dredging Co.—I was notified and reached the tug an hour and a quarter after the accident. I went below at once and found the greater portion of the boiler melted down on the grate bars. It was so hot that I could hardly stay in the fire-room, it was still red-hot. I have often examined the boiler and found the tubes above the fire in fairly good condition, being probably a quarter of an inch off the horizontal. I have never received a report from the engineer that the feed pumps did not work properly or that the water was not freely supplied, even when I asked him.

Mr. James Kaine of L. Boyer's Sons—I visited the Beard on the morning after the accident, accompanied by Messrs. Munkenbeck and F. W. Boyer. I noticed that there was between 3 and 4 inches of water in the gauge glass, and upon trying the connection to the boiler found them

closed. I called the attention of Messrs. Munkenbeck and Boyer to this.

Mr. Munkenbeck verified the statement of Mr. Kaine. The testimony of Messrs. Kaine and Munkenbeck was directly opposed to that of the engineers, both of whom claimed they had tried the connections and that they were open. The local inspectors evidently accepted the version of Messrs. Kaine and Munkenbeck, as their report indicates:

Steam Vessel Inspection Service,
Office of Local Inspectors.
New York, Dec. 29, 1899.

George H. Starbuck, Esq.—Supervising Inspector, Second District, New York, N. Y.—Sir: We have the honor to report that this board held an investigation at this office on Dec. 11, 1899, in the matter of the burning of the pipe boiler on the tug Wm. H. Beard on the 13th day of September, 1899. We have carefully read over the evidence in this case and are of the opinion that the engineer, _____, was to blame for the burning of said boiler, and we therefore reduce his grade of license from assistant engineer in charge of condensing tug and freight steamers of 75 gross tons to that of "an assistant engineer," as per authority conferred on us by section 441 of the revised statutes of the United States.

(Signed) THOMAS H. BARRETT,

PETER C. PETRIE,

Local Inspectors.

An examination of the melted boiler shows that the tubes are free and the circulation not impeded; that the tubes on the inside and on the outside are coated with black oxide of iron, and that the greatest heat was amongst the tubes. Also, of the 785 evaporating tubes, over 300 were melted. Black oxide of iron has the appearance of plumbago and is made by passing of oxygen gas over red-hot iron. From the condition of the boiler and the above evidence, the following conclusions are inevitable:

First—That by reason of the connections between the boiler and the gauge glass being closed, the engineer did not know where his water level was, and that it had been materially lowered during the hour and one-half while lying still before towing the large scow; also, that the towing



Fig. 3.

of the big loaded scow against the tide was hard work for the little boat, and that there was an unusual consumption of water. Thus the upper evaporating tubes became empty of water, and when the exhaust was put into the stack they became superheated and then red-hot, at which time the steam was decomposed into oxygen and hydrogen gases. These gases were released by a split in some of the pipes; part of the oxygen combined with the iron formed black oxide of iron, leaving the hydrogen and balance of the oxygen to again combine with different chemical proportions and thus with the aid of the fire produce the terrific heat that melted the boiler tubes. This was further aided by the air that passed over the fire, the boiler doors being open at the time, and the engineer engaged in hauling the fire. That the heat amongst the tubes must have been terrific is proven by the fact that they were of wrought iron, a substance almost impossible to bring to a liquid state, and further that one hour and a quarter after the accident the fireroom was so hot that Supt. Arnold could hardly stay there.

Second—That if this carelessness had happened to any shell boiler or water tube boiler wherein the steam drain was accessible to the fire or the evaporating tubes of large diameter, there would have been the releasing of immense quantities of the gases, resulting in a great explosion, with loss of life and property.

Third—That the fact that the Boyer patent sectional water tube boiler can be subjected to this abuse and limit its owner's loss to simply the repair of the boiler, should make it a favorite with all owners, engineers and firemen.

Note.—The first of the accompanying illustrations shows that the damage was confined entirely to the nest of tubes; the second shows the hole melted into the tubes; and the third a closer view of the melting.

RECOMMENDS KRUPP ARMOR.

Rear Admiral O'Neil, chief of the Bureau of Ordnance, appeared before the naval committee of the House a day or two ago and recommended the adoption of Krupp armor for all naval vessels. He expressed himself in opposition to the government establishing an armor plate factory but thought that the scheme was not impracticable. Russia, he said, was building an armor plate plant and his information was to the effect that it would be successful.

Mileage tickets of the Central Passenger Association are good on the Nickel Plate road between Buffalo, Chicago or intermediate stations.
32 Mar. 16.

A SHIP ASHORE.



DIAMOND SHOAL LIGHT-SHIP AS IT APPEARED ON THE BEACH AFTER A RECENT ATLANTIC GALE.

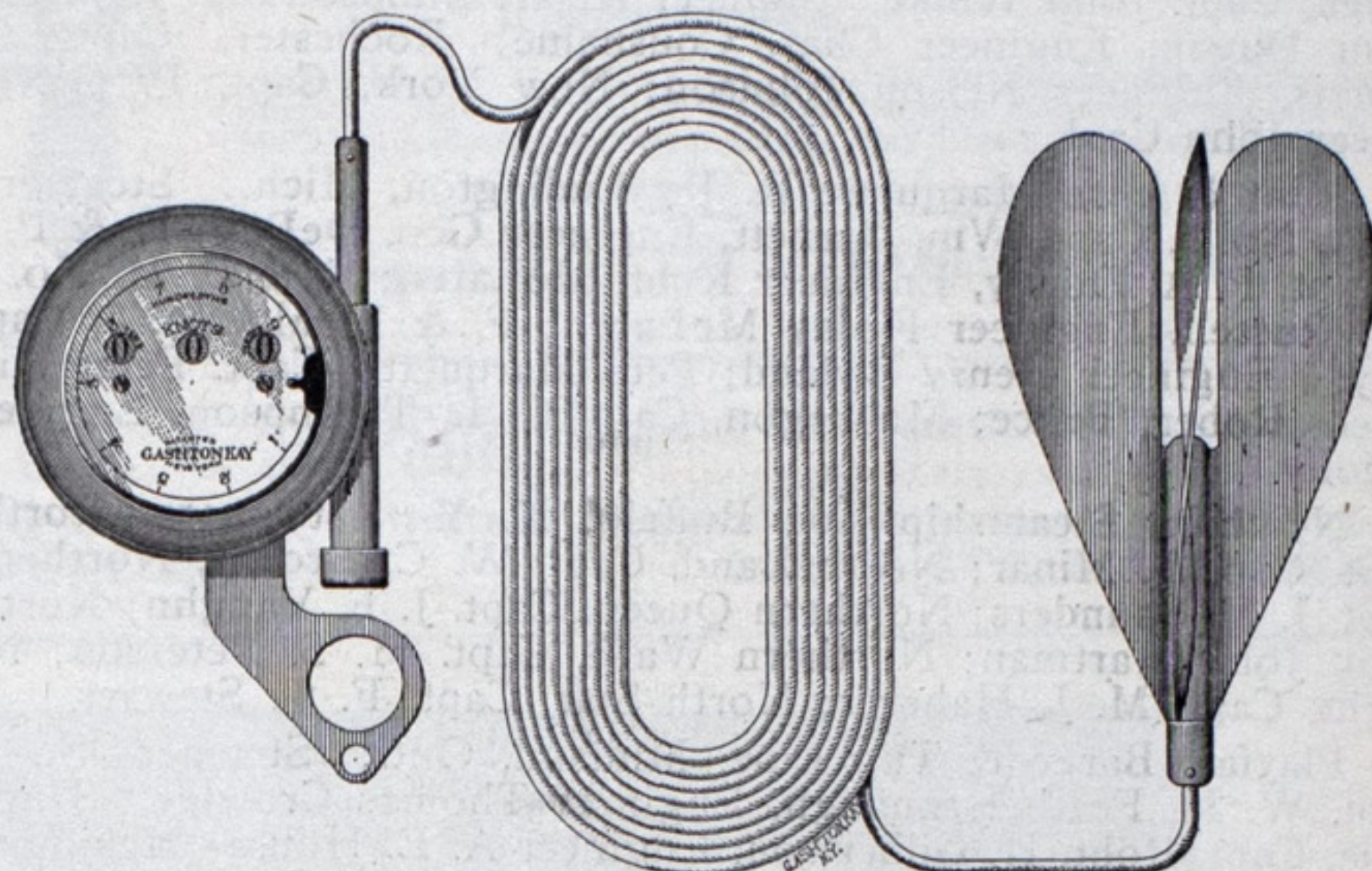
FOREIGN DEMAND NO SMALL FACTOR.

The Iron Trade Review of Cleveland, always conservative and well informed, says of the iron market:

"It is becoming plainer as the iron trade goes farther into the year that the foreign demand will be no small factor in determining the course of prices in 1900. The inquiries recently received from the British isles and from the continent, and the strong support foreign iron and steel prices bid fair to have, indicate that with only moderate concessions from the present basis our manufacturers could market a large tonnage abroad. The bearing of this condition upon domestic prices is most important. From today's outlook it practically precludes any considerable recession in the home market, though it still leaves the trade without the light it seeks as to the approximate basis on which the year's new buying is to be done. Scarce and high-priced fuel is an important factor in the situation both in England and in Germany, and the indications now point to a firmer market in both countries for all iron and steel products. Inquiries for foundry iron continue to come to southern furnaces, and at concessions of \$1 to \$2 a ton a large business could be done, with ocean freights on today's basis. The large producers of steel and of bars have received good inquiries also from foreign consumers. In rails some export sales have been made in the east at \$31 and \$32 tidewater."

KAY TAFFRAIL LOG.

The Kay taffrail log was specially invented for small yachts and has been in use two years. It has also been tried by some of the captains of large ships and found to work to great satisfaction; as it has a greater scope of speed, registering from one knot or mile an hour to forty, while many other logs do not register less than four knots an hour, on account of their weight, which causes them to sink; and on the other hand in going fast the weight and great length of line are a drag which in the course of a day makes considerable difference in the distance traveled. This log not only registers the distance traveled but you can tell from it



THE KAY TAFFRAIL LOG.

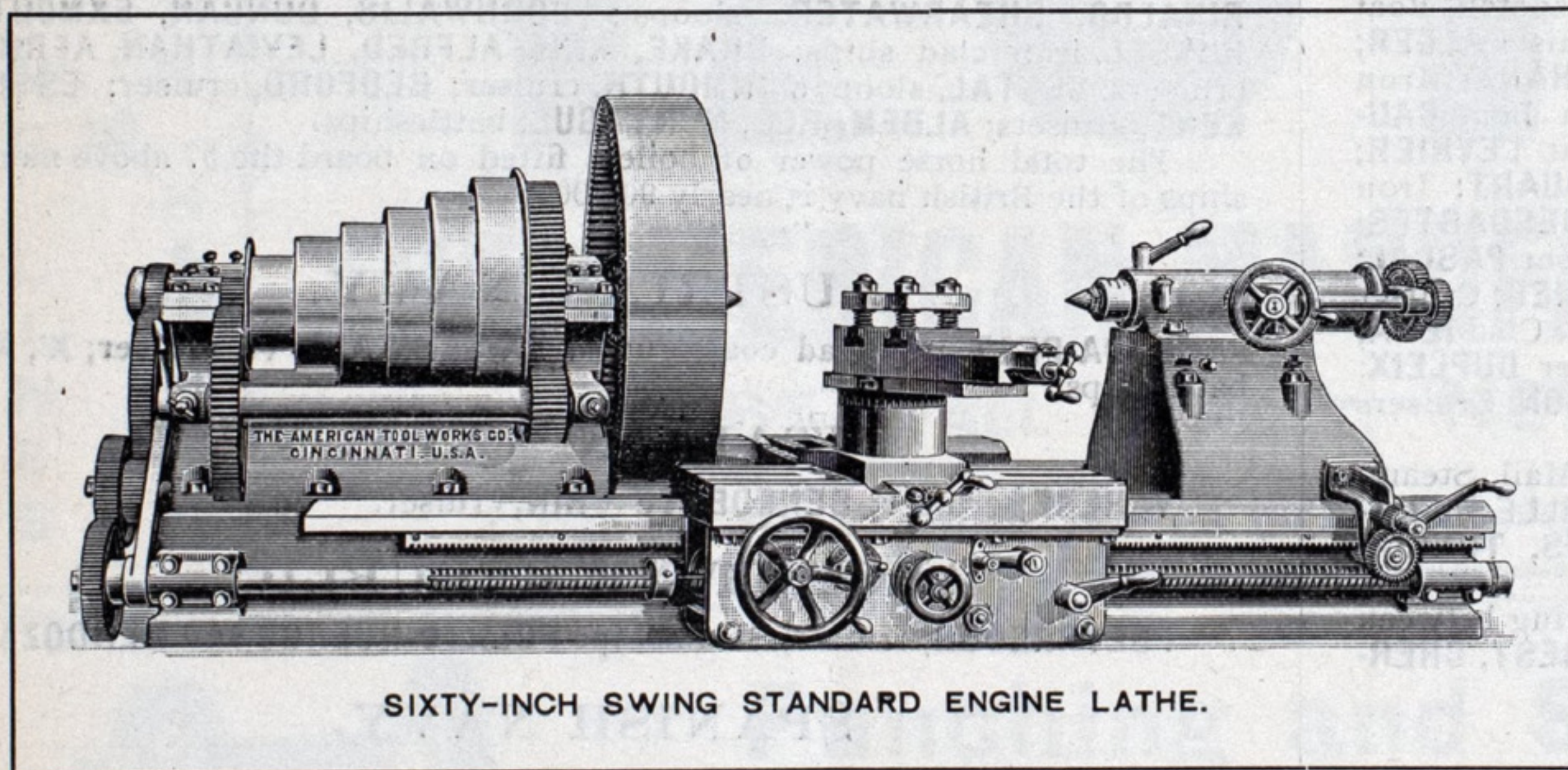
at any time the number of knots or miles the vessel is making per hour, which is very handy in figuring the time at which you will probably make your port or harbor.

This log is also being used by surveyors in the Klondike regions to get the speed of current and tides in rivers and bays for chart and map purposes, and it is just the log for conning a boat in order to get the best results out of the propeller or sails in all kinds of weather. There are a great number of these logs in use now and the results are everywhere satisfactory.

Improvements have been made in the log so that it now covers the whole field of measuring speed and distance of ships, yachts, small sail boats, canoes and row-boats, and it has even been used with success on model yachts. It also is in use for laying out courses for racing by some of the yacht clubs and is being offered as prizes in the club regattas. It is very cheap as compared with prices of other logs and everybody can afford to have one. For further information, prices, etc., address G. Ashton Kay, No. 253 Broadway, New York.

Central Passenger Association mileage tickets are accepted for passage on all trains of the Nickel Plate road.
31 Mar. 16.

52" AND 60" Swing Standard Engine Lathes



SIXTY-INCH SWING STANDARD ENGINE LATHE.

WE show herewith an illustration of our 52-inch and 60-inch Swing Standard Engine Lathes. These tools have all the latest improvements.

We are also builders of a complete line of high-grade tools for Machine Shop Equipment.

The American Tool Works Co.,

WORKS: CINCINNATI, U. S. A.

NEW YORK OFFICE: 120 Broadway,
Geo. Place, Agent.

NEW ORLEANS: The Fairbanks Co.

CHICAGO STORE: 68-70 South Canal Street.

PHILADELPHIA: The Fairbanks Co.

CLEVELAND: The Strong, Carlisle & Hammond Co.

BOSTON STORE: 36 Federal Street.

BALTIMORE: The Fairbanks Co.

SAN FRANCISCO: Henshaw, Bulkley & Co.

DENVER AND SALT LAKE CITY: The Mine & Smelter
Supply Co.

LONDON: Alfred Herbert, Ltd., 7 Leonard St.,
Finsbury, E. C.

DÜSSELDORF: de Fries & Co., Act. Ges.,
Graf Adolf Strasse, 83-87

ANTWERP: Nyssens Frères, 33 Rue des Peignes.

BERLIN: de Fries & Co., Act. Ges.,
Kloster Strasse, 13-15.

PARIS: Roux Frères & Cie., 54 Boulevard
du Temple.

MOSCOW: Alfred Stucken.

MASTERS AND ENGINEERS.

APPOINTMENTS OF OFFICERS FOR SHIPS OF THE GREAT LAKES,
SEASON OF 1900.

Union Steamboat Co., Buffalo, N. Y.: Steamers—Starrucca, Capt. Walter Robinson, Engineer Alexander Brown; Ramapo, Capt. J. H. McDonald, Engineer H. C. Jordon; Chemung, Capt. F. B. Huyck, Engineer George Fritsche; Owego, Capt. John Byrne, Engineer H. Hill; Tioga, Capt. John Wulke, Engineer Albert Simpson; H. J. Jewett, Capt. John Dugan, Engineer Chas. Coushaine; Rochester, Capt. Geo. T. Morris, Engineer Nelson Johnson; New York, Capt. P. O'Neill, Engineer John Caul.

Flint & Pere Marquette R. R., Ludington, Mich.: Steamers—F. & P. M. No. 2, Capt. Wm. Barnett, Engineer Geo. DePuy; F. & P. M. No. 3, Capt. P. A. Dority, Engineer Robt. McLaren; F. & P. M. No. 4, Capt. Jos. Russell, Engineer Finlay McLaren; F. & P. M. No. 5, Capt. John Doyle, Engineer Henry Nyland; Pere Marquette, Capt. Peter Kilty, Engineer Robert Bruce; Muskegon, Capt. G. L. Thompson, Engineer Wm. Elliott.

Northern Steamship Co., Buffalo, N. Y.: Steamers—North West, Capt. Geo. A. Minar; North Land, Capt. W. C. Brown; Northern King, Capt. J. M. Saunders; Northern Queen, Capt. J. F. Vaughn; North Wind, Capt. John Hartman; Northern Wave, Capt. M. S. Peterson; Northern Light, Capt. M. J. Haberer; North Star, Capt. F. G. Stewart.

Playfair Barge & Tug Line, Midland, Ont.: Steamer—St. Andrew, Capt. W. H. Featherstonagh, Engineer Thomas Crowley. Tugs—Magnolia, Capt. Robt. H. Gilbertson, Engineer A. E. House; Metamora, Capt. Jos. Tindall, Engineer Geo. A. Smith; Minatoga, Capt. Edward Burke, Engineer Jos. McGregor; Margherita, Capt. Jas. O'Connor, Engineer Harry Hewitt.

Richardson, W. C., Cleveland: Steamers—J. H. Wade, Capt. Richard Call, Engineer Geo. McMonagle; J. H. Devereux, Capt. John H. Babbitt, Engineer Thomas Shannon; Iroquois, Capt. E. J. Burke, Engineer Lawrence J. Regan; J. H. Outhwaite, Capt. Chas. R. Cleveland, Engineer R. A. Davidson. Schooner—H. A. Barr, Capt. John Eberlein.

Gilchrist, F. W., Alpena, Mich.: Steamers—Viking, Capt. H. Richardson, Engineer —; J. C. Hall, Capt. H. L. Foster, Engineer L. Richard; Norseman, Capt. Henry Bennet, Engineer Harry Packer. Schooners—Vinland, Capt. Thos. Stephens; Nellie Mason, Capt. J. B. Mitchell; Sam. Flint, Capt. —.

Republic Iron Co., Cleveland, O.: Steamers—Republic, Capt. Wm. McGarvey, Engineer Wm. Lowe; Specular, Capt. Edward Mooney, Engineer John Smith; Continental, Capt. W. A. Black, Engineer A. Mc-

Gregor. Schooners—Magnetic, Capt. Harry Rogers; Grace Holland, Capt. B. M. Landfair.

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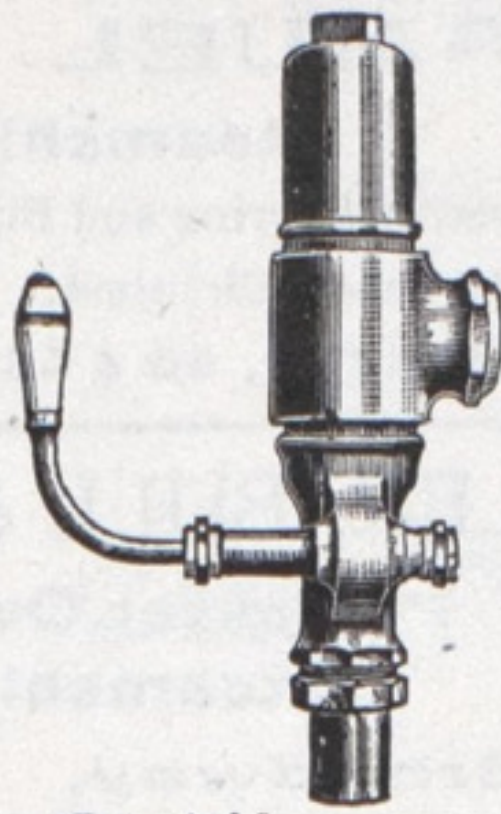
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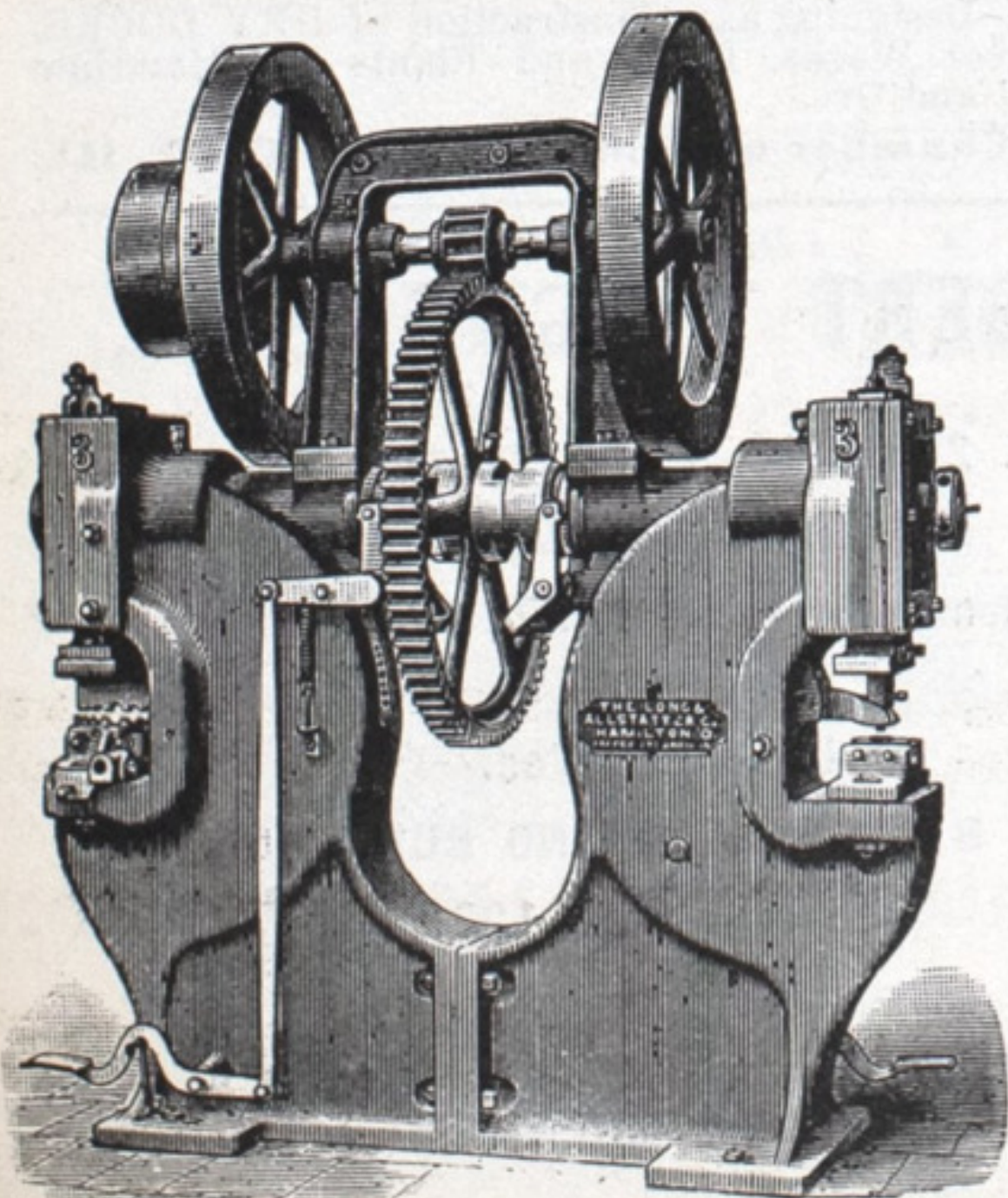
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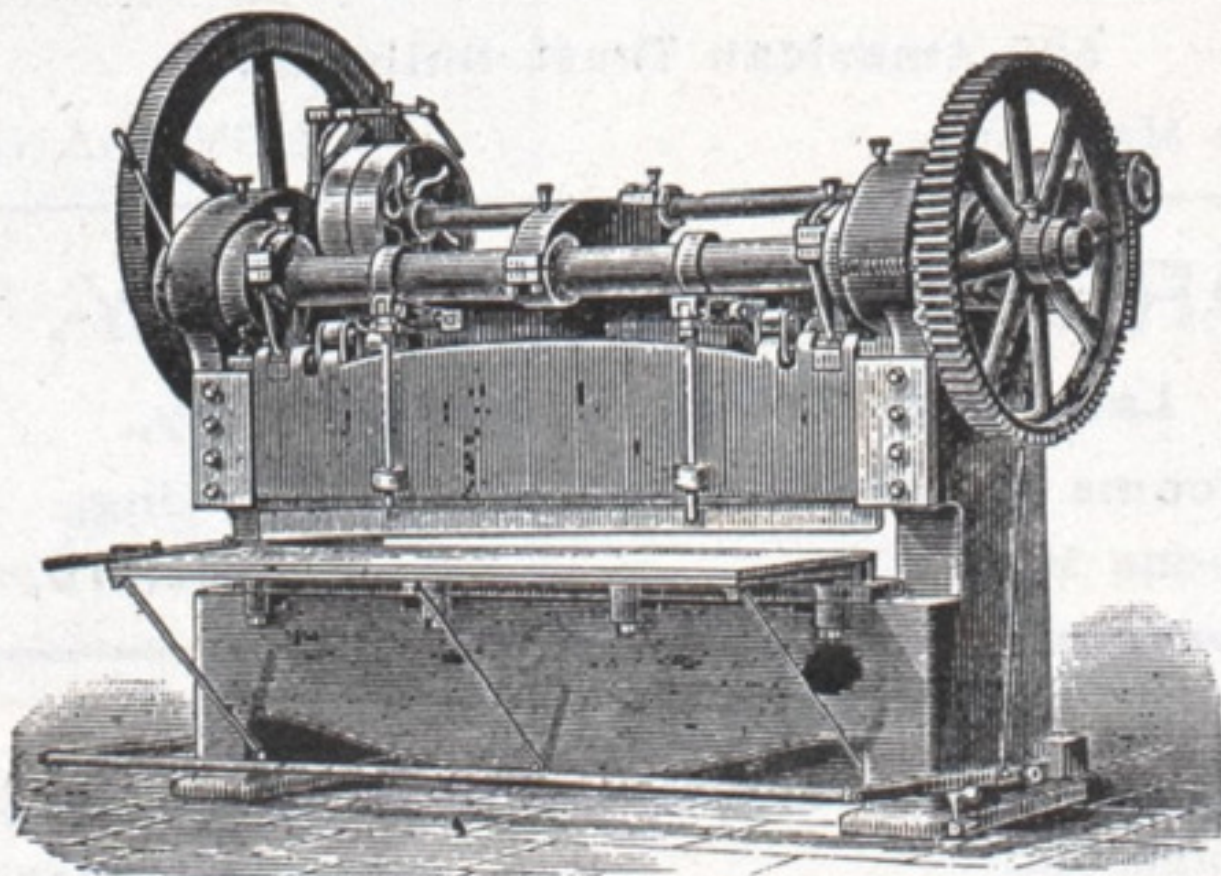
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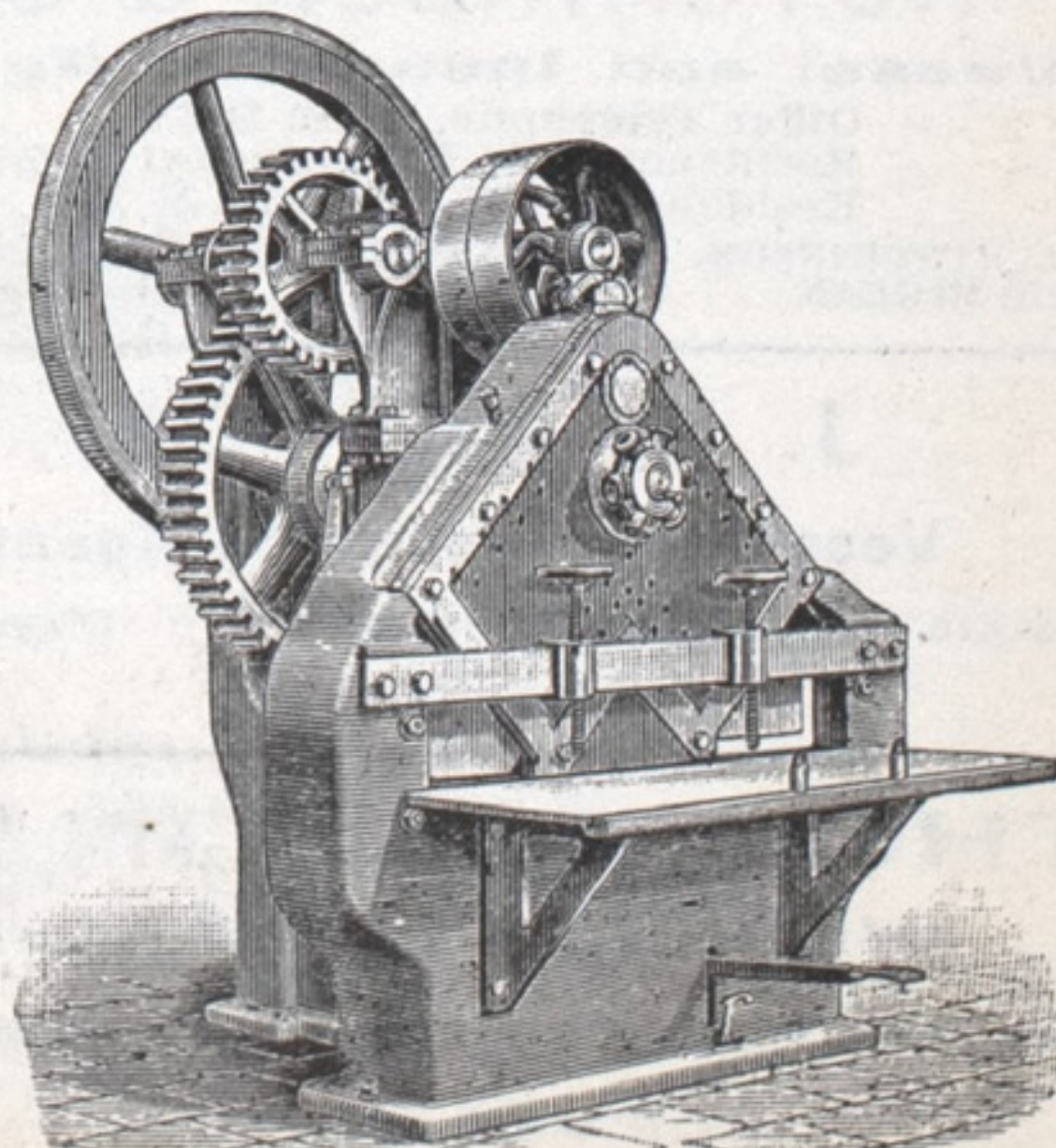
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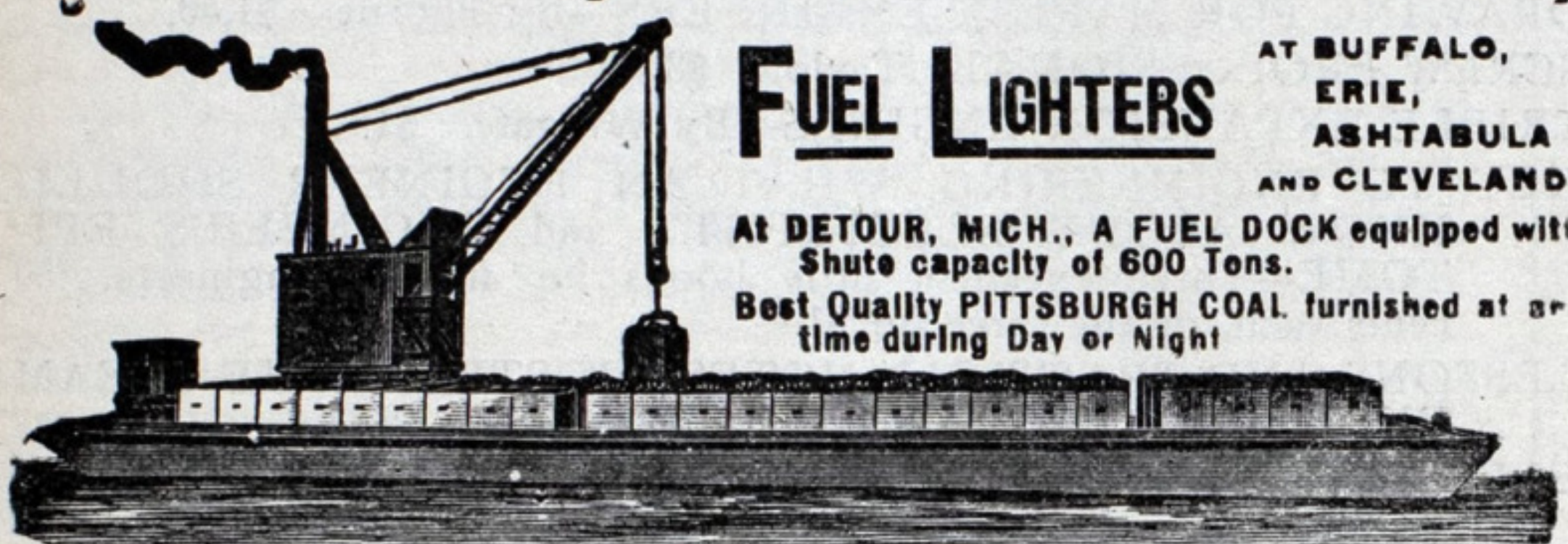
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TELEGRAPH Capt. MARTIN SWAIN, CHEBOYGAN, MICH.

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U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., January 29, 1900. Sealed proposals for Extension and Repair of Piers at Manistee, Mich., will be received here until 3 p. m., February 28, 1900, and then publicly opened. Information furnished on application. Chester Harding, Capt., Engrs. Feb. 22.

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U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., February 21, 1900. Sealed proposals for Repair of Pier at Charlevoix, Mich., will be received here until 3 P. M., March 23, 1900, and then publicly opened. Information furnished on application. Chester Harding, Capt., Engrs. Mar. 15.

Office of Light-House Engineer, Mobile, Ala., Feb. 15, 1900. The wooden two-masted schooner Clover, about two hundred and fifty tons burden, will be sold at public auction in Mobile, Ala., on March 21, 1900. For information apply to Lieut. Col. A. N. Damrell, Light-House Engineer, Mobile, Ala. Mar. 1.

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., February 13, 1900. Sealed proposals for Extension and Repair of Piers at Frankfort, Mich., will be received here until 3 P. M., March 15, 1900, and then publicly opened. Information furnished on application. Chester Harding, Capt., Engrs. Mar. 8.

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., February 13, 1900. Sealed proposals for Dredging at Harbors on East Shore of Lake Michigan will be received here until 3 P. M., March 15, 1900, and then publicly opened. Information furnished on application. Chester Harding, Capt., Engrs. Mar. 8.

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